Exhibit 1

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

Proposed Rulemaking Language, WildEarth Guardians Petition to Issue new Rules Under 30 C.F.R. §§ 816 and 817.

WildEarth Guardians petitions the Director of the Office of Surface Mining Reclamation and Enforcement ("OSM") to issue rules establishing standards to limit emissions of nitrogen oxides, including nitrogen dioxide, associated with the use of explosives at coal mines. Guardians specifically proposes that OSM limit visible emissions of nitrogen dioxide when blasting is undertaken in conjunction with surface mining operations, which includes the surface impacts of underground mining. These rules are proposed in order to ensure that states and OSM limit blasting so as to prevent injury to persons in accordance with the Surface Mining Control and Reclamation Act ("SMCRA").

Below is proposed rule language, which WildEarth Guardians proposes OSM promulgate under 30 C.F.R. §§ 816 and 817, which set forth permanent program environmental protection performance standards related to surface coal mining and the surface impacts of underground mining, respectively. 30 C.F.R. § 816.67 sets forth standards to control adverse effects related to the use of explosives at surface mines. 30 C.F.R. § 817.67 sets forth standards to control adverse effects related to the use of explosives in conjunction with the surface impacts of underground mining. Guardians proposes that OSM add a new paragraph (f) under both 816.67 and 817.67. This paragraph would be identical, but would ensure that emissions are appropriately limited at both surface and underground mines as required by SMCRA. This language is proposed by WildEarth Guardians with the expectation that OSM will ultimately initiate a public rulemaking process to determine and refine the most appropriate language.

The proposed rules will ensure blasting emissions are kept in check in order to protect national ambient air quality standards established by the U.S. Environmental Protection Agency and, in turn, public health. Mounting evidence indicates nitrogen oxide concentrations are not being kept in check, threatening injury to people. Notably, current rules allow blasting emissions to exceed national ambient air quality standards limiting nitrogen dioxide, a harmful air pollutant that endangers workers and the public. The proposed rules would ensure better blasting practices are utilized in order to prevent injury and would ensure that mining operations fully comply with SMCRA.

Proposed Rule Language, 30 C.F.R. §§ 816 and 817

....

30 C.F.R. § 816.67

....

(f) *Nitrogen oxide emissions.*

(1) Blasting shall be conducted so as to prevent visible emissions of nitrogen oxides, including nitrogen dioxide.

(2) The operator shall visually monitor all blasting activities (through the use of remote surveillance or other

acceptable methods for detecting visible emissions) and promptly report in writing any instances of visible emissions of nitrogen oxides to the regulatory authority.

....

30 C.F.R. § 817.67

....

(f) *Nitrogen oxide emissions.*

(1) Blasting shall be conducted so as to prevent visible emissions of nitrogen oxides, including nitrogen oxides.

(2) The operator shall visually monitor all blasting activities (through the use of remote surveillance or other acceptable methods for detecting visible emissions) and promptly report in writing any instances of visible emissions of nitrogen oxides to the regulatory authority.

Exhibit 2

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

Nitrogen Dioxide
Health

Current scientific evidence links short-term NO_2 exposures, ranging from 30 minutes to 24 hours, with adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma.

Also, studies show a connection between breathing elevated short-term NO_2 concentrations, and increased visits to emergency departments and hospital admissions for respiratory issues, especially asthma.

NO_2 concentrations in vehicles and near roadways are appreciably higher than those measured at monitors in the current network. In fact, in-vehicle concentrations can be 2-3 times higher than measured at nearby area-wide monitors. Near-roadway (within about 50 meters) concentrations of NO_2 have been measured to be approximately 30 to 100% higher than concentrations away from roadways.

Individuals who spend time on or near major roadways can experience short-term NO_2 exposures considerably higher than measured by the current network. Approximately 16% of U.S housing units are located within 300 ft of a major highway, railroad, or airport (approximately 48 million people). This population likely includes a higher proportion of non-white and economically-disadvantaged people.

NO_2 exposure concentrations near roadways are of particular concern for susceptible individuals, including people with asthma asthmatics, children, and the elderly

The sum of nitric oxide (NO) and NO_2 is commonly called nitrogen oxides or NOx. Other oxides of nitrogen including nitrous acid and nitric acid are part of the nitrogen oxide family. While EPA's National Ambient Air Quality Standard (NAAQS) covers this entire family, NO_2 is the component of greatest interest and the indicator for the larger group of nitrogen oxides.

NOx react with ammonia, moisture, and other compounds to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death.

Ozone is formed when NOx and volatile organic compounds react in the presence of heat and sunlight. Children, the elderly, people with lung diseases such as asthma, and people who work or exercise outside are at risk for adverse effects from ozone. These include reduction in lung function and increased respiratory symptoms as well as respiratory-related emergency department visits, hospital admissions, and possibly premature deaths.

Emissions that lead to the formation of NO_2 generally also lead to the formation of other NOx. Emissions control measures leading to reductions in NO_2 can generally be expected to reduce population exposures to all gaseous NOx. This may have the important co-benefit of reducing the formation of ozone and fine particles both of which pose significant public health threats.

Exhibit 3

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

NITROGEN OXIDES (nitric oxide, nitrogen dioxide, etc.)

CAS #10102-43-9 (nitric oxide);
CAS #10102-44-0 (nitrogen dioxide)

Division of Toxicology ToxFAQs™ April 2002

This fact sheet answers the most frequently asked health questions (FAQs) about nitrogen oxides (nitric oxide, nitrogen dioxide, etc.). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Everybody is exposed to small amounts of nitrogen oxides in ambient air. Higher exposure may occur by burning wood or kerosene or near gas stoves or if you smoke. Exposure to high levels of nitrogen oxides can damage the respiratory airways. Contact with the skin or eyes can cause burns. Nitrogen dioxide and nitric oxide have been found in at least 9 and 6 of the 1,585 National Priorities List sites identified by the Environmental Protection Agency (EPA), respectively.

What are nitrogen oxides?

Nitrogen oxides are a mixture of gases that are composed of nitrogen and oxygen. Two of the most toxicologically significant nitrogen oxides are nitric oxide and nitrogen dioxide; both are nonflammable and colorless to brown at room temperature. Nitric oxide is a sharp sweet-smelling gas at room temperature, whereas nitrogen dioxide has a strong, harsh odor and is a liquid at room temperature, becoming a reddish-brown gas above 70 °F.

Nitrogen oxides are released to the air from the exhaust of motor vehicles, the burning of coal, oil, or natural gas, and during processes such as arc welding, electroplating, engraving, and dynamite blasting. They are also produced commercially by reacting nitric acid with metals or cellulose.

Nitrogen oxides are used in the production of nitric acid, lacquers, dyes, and other chemicals. Nitrogen oxides are also used in rocket fuels, nitration of organic chemicals, and the manufacture of explosives.

What happens to nitrogen oxides when they enter the environment?

❑ Nitrogen oxides are broken down rapidly in the atmosphere by reacting with other substances commonly found in the air. The reaction of nitrogen dioxide with chemicals produced by sunlight leads to the formation of nitric acid, which is a major constituent of acid rain. Nitrogen dioxide also reacts with sunlight, which leads to the formation of ozone and smog conditions in the air we breathe.

❑ Small amounts of nitrogen oxides may evaporate from water, but most of it will react with water and form nitric acid.

❑ When released to soil, small amounts of nitrogen oxides may evaporate into air. However, most of it will be converted to nitric acid or other compounds.

❑ Nitrogen oxides do not build up in the food chain.

How might I be exposed to nitrogen oxides?

❑ The general population is primarily exposed to nitrogen oxides by breathing in air. People who live near combustion sources such as coal burning power plants or areas with heavy motor vehicle use may be exposed to higher levels of nitrogen oxides.

❑ Households that burn a lot of wood or use kerosene heaters and gas stoves tend to have higher levels of nitrogen oxides in them when compared to houses without these appliances.

❑ Nitric oxide and nitrogen dioxide are found in tobacco smoke, so people who smoke or breathe in second-hand smoke may be exposed to nitrogen oxides.

NITROGEN OXIDES (nitric oxide, nitrogen dioxide, etc.)

CAS #10102-43-9 (nitric oxide); CAS #10102-44-0 (nitrogen dioxide)

❑ Workers employed in facilities that produce nitric acid or certain explosives like dynamite and trinitrotoluene (TNT), as well as workers involved in the welding of metals may breath in nitrogen oxides during their work.

How can nitrogen oxides affect my health?

Low levels of nitrogen oxides in the air can irritate your eyes, nose, throat, and lungs, possibly causing you to cough and experience shortness of breath, tiredness, and nausea. Exposure to low levels can also result in fluid build-up in the lungs 1 or 2 days after exposure. Breathing high levels of nitrogen oxides can cause rapid burning, spasms, and swelling of tissues in the throat and upper respiratory tract, reduced oxygenation of body tissues, a build-up of fluid in your lungs, and death.

If you were to come into skin or eye contact with high concentrations of nitrogen oxide gases or nitrogen dioxide liquid, you would likely experience serious burns.

We do not know if exposure to nitrogen oxides will result in reproductive effects in humans.

How likely are nitrogen oxides to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified nitrogen oxides for potential carcinogenicity.

How can nitrogen oxides affect children?

Children would probably be affected by exposure to nitrogen oxides in the same ways as adults. But we do not know whether children differ from adults in their susceptibility to nitrogen oxides.

Exposure of pregnant animals to nitrogen oxides has resulted in toxic effects in developing fetuses. Nitrogen oxides have also caused changes in the genetic material of animal cells. But we do not know if exposure to nitrogen oxides might cause developmental effects in humans.

How can families reduce the risk of exposure to nitrogen oxides?

Families with indoor gas stoves, space heaters, or indoor cigarette smoke can minimize indoor exposure to nitrogen oxides by periodically allowing fresh outdoor air into the home. Farm families should not allow children to play near silos that contain silage.

Is there a medical test to show whether I've been exposed to nitrogen oxides?

Specific tests for the presence of nitrogen oxides in blood or urine are not generally useful to the doctor. If a severe exposure has occurred, blood and urine analyses and other tests may show whether damage has been done to your respiratory airways. Some of these tests may be done at the doctor's office, others may require a clinic or hospital that have specialized equipment.

Has the federal government made recommendations to protect human health?

The EPA has established that the average concentration of nitrogen dioxide in ambient air in a calendar year should not exceed 0.053 parts of nitrogen dioxide per million parts of air (0.053 ppm).

The Occupational Safety and Health Administration (OSHA) has set a limit of 25 ppm of nitric oxide in workplace air during an 8-hour workday, 40-hour work week. OSHA has also set a 15-minute exposure limit of 5 ppm for nitrogen dioxide in workplace air.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

Exhibit 4

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

EPA United States Environmental Protection Agency

Air Quality Guide for Nitrogen Dioxide

Air Quality Index	Protect Your Health Near Roadways
Good (0-50)	No health impacts are expected when air quality is in this range.
Moderate (51-100)	Individuals who are unusually sensitive to nitrogen dioxide should consider limiting prolonged outdoor exertion.
Unhealthy for Sensitive Groups (101-150)	The following groups should limit prolonged outdoor exertion: • People with lung disease, such as asthma • Children and older adults
Unhealthy (151-200)	The following groups should avoid prolonged outdoor exertion: • People with lung disease, such as asthma • Children and older adults Everyone else should limit prolonged outdoor exertion.
Very Unhealthy (201-300)	The following groups should avoid all outdoor exertion: • People with lung disease, such as asthma • Children and older adults Everyone else should limit outdoor exertion.

What You Should Know About Nitrogen Dioxide and Your Health

- Nitrogen dioxide comes from vehicles, power plants, industrial emissions and off-road sources such as construction, lawn and gardening equipment. All of these sources burn fossil fuels.
- People who live or work near busy roadways can experience high exposures.
- Find out more about air quality through TV, radio, newspapers, AIRNow (www.airnow.gov) and EnviroFlash (www.enviroflash.info), so you can take steps to protect your health.

Revisions to the National Ambient Air Quality Standards for Nitrogen Dioxide

On January 22, 2010, EPA strengthened the health-based National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (NO_2). EPA set a 1-hour NO_2 standard at the level of 100 parts per billion (ppb). EPA also retained the annual average NO_2 standard of 53 ppb.

The 1-hour standard will protect public health by limiting people's exposures to short-term peak concentrations of NO_2 – which primarily occur near major roads. Community-wide NO_2 concentrations will be limited to levels below those that have been linked to respiratory-related emergency room visits and hospital admissions.

Additionally, EPA established ambient air monitoring and reporting requirements for NO_2. In urban areas, monitors are required near major roads and in other locations where maximum concentrations are expected. EPA has placed a number of monitors in locations to help protect communities that are susceptible to NO_2-related health effects.

What is nitrogen dioxide and where does it come from?

EPA's NAAQS for NO_2 is designed to protect against exposure to the entire group of nitrogen oxides (NOx). NO_2 is the component of greatest concern and is used as the indicator for the larger group of NOx. The sum of nitric oxide (NO) and NO_2 is commonly called NOx. Other nitrogen oxides include nitrous acid and nitric acid. NOx reacts with volatile organic compounds to form ozone.

NO_2 forms from ground-level emissions related to the burning of fossil fuels from vehicles, power plants, industrial sources, and off-road equipment, such as construction vehicles and lawn and garden equipment. In addition to contributing to ground-level ozone formation, NO_2 is linked with a number of adverse effects on the respiratory system. NOx reacts with ammonia, moisture, and other compounds to form small particles. These small particles can penetrate deeply into sensitive parts of the lungs.

How does nitrogen dioxide affect health?

Scientific evidence links short-term NO_2 exposures, ranging from 30 minutes to 24 hours, with adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma.

Studies also show a connection between short-term exposure and increased emergency room visits and hospital admissions for respiratory illnesses.

Who is sensitive to nitrogen dioxide?

Individuals who spend time on or near major roads can experience NO_2 exposures considerably higher than occur away from roads. These exposures are of particular concern for sensitive groups, such as people with lung disease including asthma, children and older adults.

Does my community have unhealthy NO2 levels?

Unlike ozone and particle pollution, which can be of concern over large regions, NO_2 levels are appreciably higher in close proximity to pollution sources (e.g., vehicles on major freeways, factories). Health effects associated with NO_2 are much less likely farther away from these pollution sources.

NO_2 in heavy traffic or on freeways can be two times as high as levels measured in residential areas or on lesser traveled roads. Monitoring studies have shown that within approximately 50 meters of heavy traffic/ freeways, NO_2 concentrations may be 30 to 100 percent higher.

What Can You Do To Reduce NO_2 Emissions?

- When [illegible] of driving.
- Combine errands to reduce vehicle trips.
- Limit engine idling.
- When refueling, avoid spilling fuel. Tighten gas cap securely.
- Keep your car, boat, and other engines tuned up.
- Inflate car tires to the recommended pressure.
- Conserve energy at home and at work.

AIR QUALITY INDEX

Office of Air and Radiation (6101A)
EPA-450/F-11-003
www.airnow.gov
February 2011

Exhibit 5

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT

Annual Evaluation Summary Report

for the

Regulatory Program

Administered by the Land Quality Division

of the

Wyoming Department of Environmental Quality

for

Evaluation Year 2000

(October 1, 1999 to September 30, 2000)

December 7, 2000

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Appendix A: Tabular Summary of Core Data to Characterize the Program

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I. Introduction

The Surface Mining Control and Reclamation Act of 1977 (SMCRA) created the Office of Surface Mining Reclamation and Enforcement (OSM) in the Department of the Interior. SMCRA provides authority to OSM to oversee the implementation of and provide Federal funding for State regulatory programs that have been approved by OSM as meeting the minimum standards specified by SMCRA. This report contains summary information regarding the Wyoming Program and the effectiveness of the Wyoming program in meeting the applicable purposes of SMCRA as specified in section 102. The report covers the period of October 1, 1999 to September 30, 2000. Detailed background information and comprehensive reports for the program elements evaluated during the period are available for review and copying at the Casper Field Office.

The following list of acronyms is used in this report:

ACHP	Advisory Council on Historic Preservation
AQD	Air Quality Division
BLM	Bureau of Land Management
CFO	Casper Field Office
CHIA	Cumulative Hydrologic Impact Assessment
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
EQC	Environmental Quality Council
EY	Evaluation Year
LQD	Land Quality Division
NOV	Notice of Violation
NOx	Nitrogen oxides
NTTP	National Technical Training Program
OSM	Office of Surface Mining Reclamation and Enforcement
OTT	Office of Technical Transfer
PRBRC	Powder River Basin Resource Council
R2P2	Resource Recovery and Protection Plan
RSI	Random Sample Inspection
SHPO	State Historic Preservation Office
SMCRA	Surface Mining Control and Reclamation Act of 1977
TDN	Ten-Day Notice
TIPS	Technical Information Processing Systems
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WQD	Water Quality Division
WRCC	Western Regional Coordinating Center
WOC	Wyoming Outdoor Council
WWF	Wyoming Wildlife Federation

II. Overview of the Wyoming Coal Mining Industry

Over ninety-nine percent of the current coal production in Wyoming is from surface coal mines with 92 percent of the coal currently mined in the Powder River Coal Basin near Gillette, Wyoming. Until 1954, underground mines out-produced surface mines, but in that year surface mines began to dominate production. By the late 1960's, surface coal mining production in the Powder River Basin became a major contributor to the Nation's total coal production. Coal-bearing formations underlie more than 40,000 square miles, or approximately 41 percent of Wyoming's total land area. The coal mining industry directly employs approximately 4,303 people providing substantial income and secondary employment in the State. Approximately 97 percent of coal produced in Wyoming is used for electrical generation in 29 states, Canada and overseas. Coal production increased 4 percent during 2000.

The Wyoming Geological Survey estimates the quantity of Wyoming open pit coal reserves is in excess of 26.3 billion tons; an additional 38.3 billion tons of coal reserves can be recovered by underground mining methods. Coal seams in the Wasatch Formation and the underlying Fort Union Formations can exceed 100 feet in thickness with 30 to 80 foot seams being common; 220 foot thick seams have been uncovered. Wyoming coals range from lignite to high volatile A bituminous in rank with the majority of the coal produced being sub-bituminous. Wyoming has the largest reserves of "compliance coal" in the lower 48 States; that is coal of such high quality that utility companies can burn the coal in power plants without expensive scrubbers to remove sulphur dioxide emissions. Currently, over 7 billion tons of coal are leased and 377,445 acres are permitted (Table 2).

Thirty-nine active mining operations are permitted in Wyoming; 33 are surface operations, three (3) are underground operations, one permit for a dragline move from one mine site to another and two in-situ operations. The dragline move and in-situ operations are listed as "other facilities" in Table 2 of this report. Currently, nineteen mines of the thirty-nine permitted operations are producing coal. The remaining mines are either in temporary cessation, or conducting final reclamation.

In 1998 conflict developed between coalbed methane developers and the coal mining industry. BLM issued coal leases and oil and gas leases that are dependent on the same coal resources. Civil action was taken by the coal bed Methane developers to stop the R2P2 process. Due to this conflict, a moratorium was placed on the approval of the R2P2 for the Thundercloud Lease. Tension between the coal bed methane and coal industry has eased some what. Agreements have been reached by the parties and the leasing conflict has been resolved for the coalbed methane and coal mines. The moratorium on R2P2s has been lifted for the Thundercloud lease. The Thundercloud lease was split into three smaller leases. Kennecott's Jacobs Ranch mine has the eastern edge of the Thunder Cloud lease and Arch's Black Thunder mine has the remainder of the lease. R2P2s have been approved for the Kennecott's southern and Arch's lease.

BLM indicates that it will be taken a more assertive action regarding the production of coalbed

methane in advance of coal mining to avoid future conflicts. BLM plans to require time schedules and commitments for developing methane. If developers are not producing with in the schedules, they will be directed by BLM to produce or possibly loose the methane to mining operations.

Several mines are being combined into one permit. The Powder River Coal Company's North Antelope and Rochelle mines have been consolidated under one permit. Kennecott's Caballo Rojo and Cordero mines, and P&M's Kemmerer and Skull Point mines are proposing to consolidate permits. Wyodak Resources Corporation is consolidating the East Gillette and Clovis Point permits into the Wyodak mine permit.

III. Overview of the Public Participation Opportunities in the Oversight Process and the State Program

A. OSM Outreach Efforts.

The Casper Field Office (CFO) actively encourages public involvement in the Wyoming oversight and regulatory program. This includes CFO initiated contacts with citizen groups and participation in industry activities. Specifically, CFO has visited with citizens representing the Powder River Basin Resource Council (PRBRC), Wyoming Outdoor Council (WOC), Wyoming Wildlife Federation (WWF), and the Wyoming Mining Association (WMA). The purpose of these contacts is to notify these groups of OSM's activities and to provide the opportunity to interested parties to suggest how OSM's oversight role can assist in improving the State's regulatory program. In the past, CFO held public meetings; however, there was very limited public participation.

CFO has a good working relationship with the PRBRC, WOC and WWF. These organizations are actively involved in OSM and State permitting and inspection oversight activities. Such involvement has resulted in helpful changes in the State program, thus improving the overall quality of the program. PRBRC has taken an active part in the oversight process and meets with the CFO several times a year. WOC and WWF have not been as active in recent years, but CFO maintains communications with the groups, informing them of meetings and issues.

B. Wyoming Outreach Efforts

LQD has an advisory board (Land Quality Division Advisory Board) that provides recommendations to the Land Quality Division through a public forum. The Environmental Quality Council (EQC) rules on regulatory matters for all Divisions within the Department (including LQD), and also serves as the administrative hearings board for all Divisions (i.e., Land Quality, Air Quality and Water Quality Divisions) in DEQ. Wyoming's outreach efforts include, but are not limited to LQD Advisory Board meetings, and Environmental Quality Council hearings and board meetings. LQD has met on several occasions with the special interest groups (PRBRC, WOC, WWF, and WMA) to discuss their concerns. In addition, LQD has hosted several technical forums addressing current issues.

LQD also has public participation during the permitting, bond release, and enforcement processes. During the permitting and bond release processes, notices are published and comments are solicited. Citizen complaints are investigated as part of the enforcement process. Previous oversight reviews have found that LQD is highly receptive to the concerns of public, industry and citizen groups. DEQ also has an internet website at: "http://deq.state.wy.us/"with information for the public on permits, current rules, proposed rule changes and contact information.

CFO monitors DEQ's and LQD's meetings and outreach efforts and believes the State does a good job interacting with citizens.

IV. Major Accomplishments/Issues/Innovations in the Wyoming Program

A. Accomplishments

Although the State has not addressed all the outstanding regulatory program deficiencies, the State of Wyoming continues to administer an excellent Title V program (See **VII.General Oversight Topic Reviews**, B. Monitoring, Program Maintenance). Wyoming actively works to improve its program. Under the State's permitting functions, plans for an intranet system and modifying the format for reporting data in the permit Annual report are examples of these efforts and achievements.

The Wyoming Department of Environmental Quality, Land Quality Division (LQD) has installed a State intranet -- electronic communications system -- to allow ease of simultaneous permit review and data sharing by three geographically separate LQD offices (Lander, Sheridan and Cheyenne). The intranet is comprised of an LQD file directory accessible only to staff, administered through a Windows NT server in Cheyenne. The employees received training and manuals for using the intranet system in October 2000.

The intranet system moves Wyoming one step closer to implementation of electronic permitting. This allows staff in all offices (three districts and technical support) to review simultaneously all electronic documents received from mine operators using one simple interface.

The Office of Technical Transfer (OTT) provided assistance to Wyoming's electronic permitting efforts which included the purchase of a map / document scanner, digitizer and a digitizer stand, and Acrobat software.

B. Issues

Blasting / NOx Gas Issue

Blasting is a common and necessary operation at the coal mines in the Powder River Basin Coal Field. As mines have moved from truck shovel to dragline operations with larger and larger equipment, cast blasting has been used as the most economical means of displacing overburden. These changes in mining methods have resulted in vast increases in the amount of explosives used in one blast to more than 7 million pounds. These amounts of explosives are unprecedented in the industry. On occasion, blasting generates NO_X gas which forms an orange cloud. NO_X gas is a result of incomplete combustion of ANFO (ammonium nitrate and fuel oil). NO_X gas is corrosive to the eyes, skin and mucous membranes, and if inhaled can be lethal. Exceedance of five (5) parts per million (ppm) exposure for more than the short term standard period (15 minutes) can be harmful, while concentrations of 0.2 - 0.3 have ill affects on children, people with respiratory problems and the elderly. When an orange cloud is visible, the concentrations can exceed 30 ppm. (Per-Anders Perssen, Roger Holmberg. and Jaimin Lee; *Rock Blasting and Explosives Engineering*, CRC Press. 1993, Page 392.)

During the 1999 second quarterly meeting, the Wyoming Land Quality Advisory Board asked Wyoming Mining Association (WMA) to develop a solution to the problem. WMA developed a study plan and monitored NOx gas during the month of August. The results to the study were made available to the public in July 2000.

EPA became involved in a reviewing the one of the complaints mentioned above. As part of EPA's continuous involvement, on September 9, 1999, the Powder River Basin Resource Council (PRBRC) and citizens held a meeting in Gillette, WY with EPA's toxicologist and air quality specialists. The NOx gas problem was discussed and photographs of the orange clouds taken by citizens were provided to the EPA. EPA expressed their concern regarding the health affects of the NOx gas. In a follow-up meeting conducted by EPA, which included OSM, Wyoming Land Quality Division, Wyoming Air Quality Division and EPA air quality section. Several EPA air quality specialists stated that the "orange clouds" were serious.

EPA met with Wyoming LQD & AQD and OSM (CFO & WRCC) on 10/9/99 to provide options for the solution of the NOx issue. The preferred option was to allow industry to resolve the issue. EPA and LQD held another meeting on 11/30/99 to further discuss the issue with the Wyoming Mining Association (WMA). On January 12 & 13, 2000, WMA held a seminar in Gillette, WY to share blasting information with all interested parties. The seminar was attended by the public, coal operators, explosives suppliers, and Federal and State.

In addition, WMA has provided Campbell County with $40,000 for an automated emergency warning system. The warning system is in place and warning signs along Wyoming Highway 450 have been installed. The Powder River Basin Resource Council have stated that they have observed progress on the part of the coal industry. WMA provides updates at the LQD Advisory

Board meetings.

In 1995, 1998 and 1999, OSM received citizen complaints concerning NOx gases generated from blasting operations drifting off the mine permit areas. In one case OSM issued a Federal NOV (January 1999). In the two other cases, the State handled the enforcement. The enforcement action taken by the State resulted in the issuance of a notice of violation to the mine operator. The complainant requested a hearing before the Wyoming Environment Quality Council (EQC). While the EQC hearing the case, the complainant and mine operator reached a settlement agreement that outlined the safety protocols for protecting the public. Since the EPA has been involved in the NOx gas issue, the complainant requested EPA to meet with the State, mine operator and complainant to review and discuss the viability of the proposed protocols in the agreement. In addition to the steps taken by the WMA, the safety protocols outlined in the agreement will affect how other mine operators deal with the NOx gas issue throughout the Powder River Basin region.

Cooperative Agreement

CFO hosted a forum to discuss Federal land coordination which included participants from four BLM and three LQD offices, the U.S. Forest Service, WRCC, and CFO and assembled a work group to pursue the possibility of a Working Agreement under the Wyoming Cooperative Agreement. On February 28, 2000 the group developed a rough draft working agreement for comment. The work group met on April 27, 2000. Comments and revisions were adopted. LQD and BLM requested time to coordinate procedures for R2P2 which will be completed by December, 2000. BLM and LQD plan to schedule joint meetings with both agencies' field staff in February 2001. The purpose is to present the coordination processes and establish a rapport and communications between the two agencies' field staff. The coordination for the OSM mining plan approval process has been initiate and will have a rough draft completed by December, 2000. A final written Working Agreement is scheduled to be completed in April 2001.

Contemporaneous Reclamation

In 1997, CFO and LQD reviewed four mine sites for compliance with contemporaneous reclamation requirements and compared the on-the-ground reclamation with the approved reclamation plan in the permits. CFO and LQD found that the four mine permits did not clearly and concisely set time schedules and requirements for contemporaneous reclamation.

LQD agreed to review the required schedules in all permits. The State further agreed to revise the annual reporting format to include information addressing contemporaneous reclamation progression. LQD has completed reviewing about 85 percent of the permits and has required some revisions. The remaining 15 percent have not been reviewed because revisions are anticipated that will affect the reclamation schedules for these permits. LQD will review these permits after the revisions are submitted. The target for completing the reviews was originally January 1999. However, some of the expected revisions will be "major" in scope and extend

beyond January 1999. Revisions to the annual reporting format has begun. Starting in 1999, annual reports are required to contain the new format. CFO reviewed the annual report to determine how many were using the new format during the evaluation period (EY 2000). Approximately half of the annual reports have been reviewed of which approximately 50% have been revised appropriately (See section **VII. General Oversight Topic Reviews,** A. Topics, Contemporaneous Reclamation).

C. Innovations

A pilot study indicated a significant decrease in review and issue resolution time as well as the overall time to issue a permit. (See A. Accomplishments) The Wyoming DEQ-LQD is a pioneer in the development of electronic permitting. Wyoming has developed standard formats for recording and submitting data to LQD for review of permit applications.

V. Success in Achieving the Purposes of SMCRA as Determined by Measuring and Reporting End Results

To further the concept of reporting "end results," the findings from performance standards and public participation evaluations are being collected for a national perspective in terms of the number and extent of observed off-site impacts, the number of acres that have been mined and reclaimed and which meet the bond release requirements for the various phases of reclamation, and the effectiveness of customer service provided by the State. Individual topic reports are available in the Casper Field Office which provide additional details on how the following evaluations and measurements were conducted.

A. Off-Site Impacts:

There were two off-site impacts to groundwater outside the permit areas that occurred at two mine sites. In both cases, the mining operations adversely affected the water quantity of two domestic wells. The wells were the primary water supply to the occupied homes. In one case LQD took action to see that the well was replaced. In the second case, the state did not interpret its rules to cover this well replacement. OSM disagreed with LQD's interpretation and issued a TDN. After LQD's response to the TDN, LQD's response was determined to be inappropriate. A Federal inspections was ordered and a Federal NOV was issued to the mine operator. The well was replaced by the operator. (See See section **VII. General Oversight Topic Reviews,** A. Topics, Inspection and Enforcement for more information.)

Both Occurrences where domestic wells were impacted, the impacts to people, hydrology and structures were considered to be major. These impacts significantly lowered the water table, rendering the wells non-functional. There were no impacts to land.

B. Bond Release

Wyoming LQD completed 5 bond release actions during this evaluation period. There was one phase I release of 143 acres, two phase II release of 2,692 acres, and one phase III release of 33.4 acres (Table 5).

C. Reclamation Success

Approximately 337,445 acres are currently bonded (Table 5) . By end of the evaluation period, approximately 4,839 acres were permanently reclaimed with a permanent seed mixture and ready for application for phase I and II bond release. Table 6 contains data collect from 1986 to 2000, giving a long overview of the mining and reclamation activities in Wyoming.

Figure 1. Reclamation Ratio

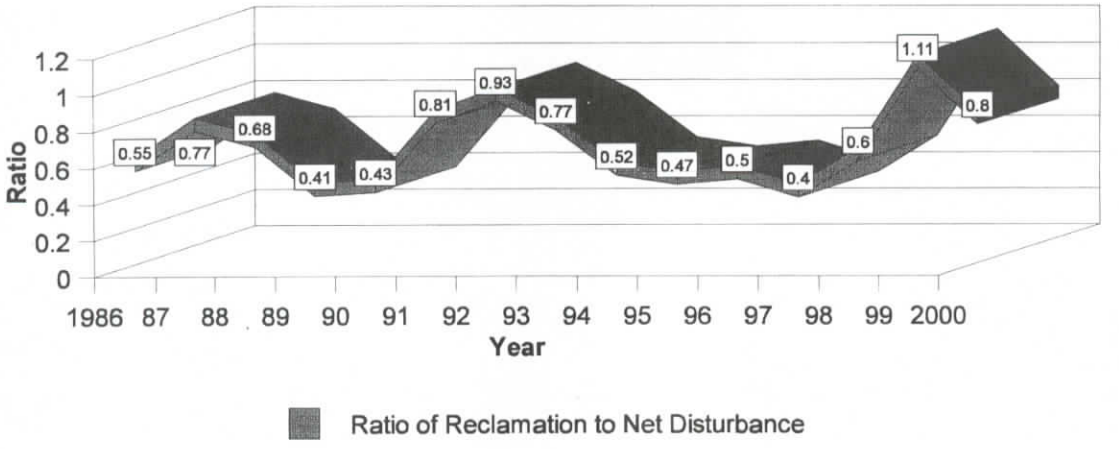

Figure 1. illustrates the ratio of the yearly permanent reclamation compared with the net disturbance found in Table 6. The net disturbance are all areas available for reclamation that are not being used for long-term approved disturbances such as: stockpiles, active pits, access roads, haul roads, railroad right-of-ways, coal preparation and loading sites, offices, shops, sediment ponds, and other approved uses. The 2000 ratio shows a 10 percent decrease of reclamation and a 24 percent increase of newly disturbed lands. The ratio of reclamation to net disturbance for EY 2000 is 0.8. A ratio of 1.0 indicates that the reclamation and net disturbance are equal. A ratio higher than 1.0 indicates that the reclamation is greater than the net disturbance, while a ratio less than 1.0 indicates the opposite. Part of this decrease in the ratio can be attributed to the new Annual Report format. The new data format in the Annual Reports specifically addresses

contemporaneous reclamation. After all the data is presented in this format, the data will become more accurate and reflect an accurate reclamation ratio.

VI. OSM Assistance

TRAINING

OSM offers training courses to State regulatory authority employees at no expense to the State (other than salary and benefits) or the attendee. OSM's technical training program provided a wide range of courses including engineering, hydrology, soils & revegetation, inspection & enforcement, and computer software. Ten Wyoming employees received training from OSM's technical training program at a cost of $ 8,149.10 during EY2000.

Ten LQD staff participated in the following National Technical Training Program (NTTP) sponsored training:

Acid-Forming Materials Principles & Process -	1 staff
Effective Writing -	1 staff
Permitting Hydrology -	1 staff
Enforcement Procedures -	2 staff
Historical & Archeology Resources -	3 staff
Wetland Awareness -	2 staff

OSM provided electronic permitting funds to the WY Department of Environmental Quality (DEQ), Land Quality Division (LQD), to assist in its ongoing effort to install a State Intranet–electronic communications system–, the purpose of which is to facilitate simultaneous permit review and data sharing by three geographically separate LQD offices (Lander, Sheridan, and Cheyenne). The Intranet installation includes an LQD web page, accessible only to staff, administered through a Windows NT server in Cheyenne. OSM funds have been and will continue to be used to develop: (1) a framework to make the Intranet operational and assessable to staff, (2) training manuals for each LQD employee, (3) access to troubleshooting at each desktop, and (4) hands-on training at the three office locations. The installation is representative of WY's long-term commitment to implement electronic permitting so that staff in all the offices (three districts and technical support) can simultaneously review all electronic documents received from mine operators, by means of one simple interface.

OSM's Technical Librarian provided 11 journal article reprints to WY DEQ LQD staff members.

OSM's Bonding Specialist provided two instances of bonding technical assistance to WY LQD staff members regarding various aspects of reclamation bonding. In particular, the specialist helped resolve a variety of issues relating to reviewing bonds for approval,

interpreting regulatory requirements, correcting errors on bonding documents, and taking actions when a surety bond had exceeded the surety company's underwriting limitations.

OTT provided the opportunity for 22 WY DEQ LQD staff members to participate in an OTT-sponsored symposium, an interactive technical forum, as well as in several workshops, as follows:

Statistical Sampling for Baseline Studies, Bond Release and Monitoring Studies

April 26-27, 2000, Santa Fe, NM — 4 DEQ LQD staff members

Electronic Permitting

May 10-11, 2000, Billings, MT — 1 DEQ LQD staff member

Electronic Permitting

July 12-13, 2000, Steamboat Springs, CO — 1 DEQ LQD staff member

Hydrology and Hydraulics Workshop

July 25-27, 2000, Denver, CO — 1 DEQ LQD staff member

Soil Geochemistry for Arid and Semi-Arid Environments Workshop

August 7-11, 2000, Socorro, NM — 2 DEQ LQD staff members

Billings Land Reclamation Symposium 2000, co-sponsored by OSM

March 24-28, 2000, Billings, MT — 7 DEQ LQD staff members participated, co-authored papers, and made presentations:

Successful Reclamation Techniques and Bond Release for a Coal Mine in Wyoming, The Topsoil Dilemma, and *Derivation and Interpretation of Wyoming's Postmining Shrub Density and Composition Standards for Coal Mine Lands.*

OSM's Interactive Forum on Surface Mining Reclamation Approaches to Bond Release: Cumulative Hydrologic Impacts Assessment and Hydrology Topics for the Arid and Semi-Arid West

August 27 - September 1, 2000, Billings, MT — 6 DEQ LQD staff members attended; in addition, staff members made two

presentations:
Alluvial Valley Floors Reclamation Bond Release Criteria and *Wyoming Cumulative Hydrologic Impact Assessment and Coalbed Methane.*

COMPUTER SUPPORT

TIPS personnel gave a brief presentation regarding TIPS' intent to provide scientific and engineering software directly to desktop workstations in TIPS customer locations. ArcInfo and AutoCAD software were delivered to these sites in early July with instructions for desktop and server installations.

The KeyServer licensing software was successfully tested in both Montana and North Dakota. KeyServer will be used to distribute software licensing to most TIPS software applications. TIPS advised each of these customer States that the remaining TIPS software will be delivered by the end of the calendar year.

CULTURAL RESOURCES

CFO continues to coordinate the National Historic Preservation Act, Section 106 cultural resource compliance for the State of Wyoming. CFO personnel work closely with the OSM Archaeologist in WRCC, Wyoming Department of Environmental Quality (DEQ), Bureau of Land Management (BLM), Wyoming State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation (ACHP) and the U.S. Forest Service (USFS) to process cultural resource clearances on new mining lands and previously permitted areas that have not been surveyed for cultural resources. This detailed involvement is necessary because the State does not have a qualified archaeologist on staff and the SHPO will not accept cultural resource work from the them. The State has taken the position that, by law, the 106 process is the responsibility of the lead Federal agency and therefore OSM is responsible for this work on any mines under permit. Prior to OSM involvement with a parcel of land, the land managing agency (BLM or USFS) would be the lead federal agency, so the State has no plans to place an archaeologist on staff since all 106 clearances are covered by Federal agencies. During this reporting period action was taken on 18 projects, which included four Memorandum of Agreements with the above mentioned agencies.

THREATENED AND ENDANGERED SPECIES

During the evaluation period, OSM Wildlife Biologist has been assisting the LQD with its responsibilities for threatened and endangered species under the Wyoming State coal program and the Endangered Species Act of 1973, as amended. The State is responsible for ensuring that no surface mining activity is conducted which is likely to jeopardize the continued existence of Federally listed or proposed endangered or threatened species, or which is likely to result in the destruction or adverse modification of designated critical

habitats of such species. The State accomplishes this by completing informal Section 7 consultations, as needed, with the U.S. Fish and Wildlife Service (USFWS). The State implements the September 24, 1996 Formal Section 7 Biological Opinion and Conference Report on Surface Coal Mining and Reclamation Operations under SMCRA (1996 Biological Opinion). The 1996 Biological Opinion covers the continuation and approval of surface coal mining and reclamation operations throughout the United States. The USFWS made this non-jeopardy determination because provisions within SMCRA preclude the State from permitting coal mining related activities that would result in jeopardizing endangered or threatened species or their critical habitat.

The OSM has coordinated and facilitated several discussions between LQD and the USFWS to work out local procedures for implementing the 1996 Biological Opinion for listed or proposed threatened and endangered species in Wyoming. With OSM's assistance, the LQD has discussed threatened and endangered species issues for various proposed mining activities with the USFWS - Cheyenne Office. The discussions focused on what, if any, species may be affected and whether protective measures are needed to minimize any adverse effects to those species. If determined to be necessary, the LQD and the USFWS developed species-specific protective measures for an operator to implement. Over the past year, the LQD and the USFWS have successfully accomplished this process and assured the protection of threatened and endangered species at several mines including Black Thunder, Jacob's Ranch, North Antelope/Rochelle Mine Complex, Antelope, and the Eagle Butte mines.

VII. General Oversight Topic Reviews

This section contains a brief description of the topics reviewed during the evaluation year. Major accomplishments, issues and innovations are addressed in Section IV of this report. The detailed documentation of all reviews are available in the central files at the Casper Field Office.

A. TOPICS

Permitting, CHIAs

In the 1992 Annual Evaluation year, CFO identified three deficiencies with some CHIA documents: 1) not all hydrologic impact projections were based on the most recent, readily available technical/baseline information; 2) assessments of hydrologic impacts were not adequate because the existing CHIA was general in scope and not specific to certain drainage basins; and, 3) the LQD did not have a formalized plan to develop comprehensive basin specific or regional CHIAs.

The LQD is conducting watershed basin specific CHIAs. As permits are revised or amended to incorporate new leases, CHIAs are being conducted as part of the permitting process. Thus far, 3 basin specific CHIAs have been completed. The CHIA for the Eagle

Butte mine was the most recent CHIA completed. Work has started on Black Thunder's CHIA for the Thunder Cloud Amendment. This CHIA is expected to be completed in January 2001.

The following are anticipated permitting actions (revisions & amendments) where CHIAs need to be initiated:

North Caballo Amendment
Antelope-Horse Creek Amendment
Buckskin Amendment
North Rochelle Amendment
Jim Bridger Amendment

Program Maintenance (Amendments)

The Wyoming State program has 72 outstanding program deficiencies, including less effective rules [30 CFR 732.17], disapproved rules [30 CFR 950.15], and required program amendments [30 CFR 950.16]. The oldest outstanding deficiencies dates back to 1986 with the most recent dating 1997. In 1994, OSM and Wyoming Land Quality Division (LQD) researched the outstanding deficiencies and developed a comprehensive list of outstanding program deficiencies. In addition, the two agencies developed amendment packages grouping the deficiencies by subject or topic. The deficiencies were divided into ten proposed amendment packages. OSM has received and approved three of these amendment packages. Seven amendment packages are pending submission to OSM. OSM and LQD established a schedule for submitting the remaining packages. The schedule has been revised several times due to delays in LQD's rule-making process.

The evaluation was divided into three (3) categories; 1) evaluation of the State's rule making process to determine why amendments are not meeting schedules, 2) evaluate whether Federal rule making changes the status of required program amendments, and 3) determine if any of the program deficiencies are non significant and can be removed. Evaluation of the first two categories has been completed.

State Rule Making Process

The Land Quality Division has developed program amendment packages. However, when the packages are reviewed by the Land Quality Advisory Board (Board) and Environmental Quality Council (Council), they are returned to LQD for a rewrite and inclusion of special interest items desired by the Board or Council. This has resulted in a "log-jam" in the Wyoming rule making process. On March 13, 2000, CFO staff met with the Administrator of LQD and discussed the lack of progress submitting program amendments on schedule. The Administrator decided to take a different approach with the Board and Council. LQD plans to para-phase

the Federal counterpart rules in its revised amendment package and place any supplemental rules that the Board and Council desire in a separate amendment package. LQD hopes to reduce controversy and expiate the rule making process.

Federal Rule Changes

Since 1986, OSM has revised, amended and removed Federal regulations. In 1994 and 1997 OSM revised several Federal rules including ownership and control requirements. The objective of this evaluation was to determine if all of the Wyoming program deficiencies are still valid based upon changes to the Federal rules in recent years.

Federal rule changes involved 26 of the 67 Wyoming program deficiencies. These changes occurred within the following parts of the Code of Federal Regulations:

- Ownership and Control [30 CFR 773.22-.25 and 778.13],
- Public Participation and Review of Permit Applications [30 CFR 773.13 & .15 and 779.25],
- Enforcement [30 CFR 843],
- Disposal of Non-coal Waste [30 CFR 816.89],
- General Environmental resource Information [30 CFR 779.12 - Cultural Resources],
- Spillways [30 CFR 816.49(a)(9)],
- Valid Existing Rights [30 CFR 761.5].

The Federal rule changes expanded and/or further defined the Federal requirements that were identified in the original deficiency letters [30 CFR 732], or Federal Register notices disapproving Wyoming rules [30 CFR 950.12] or requiring an additional program amendments [30 CFR 950.16]. None of the 26 deficiencies affected by the changes to the Federal rules were eliminated due to these changes. In instances where the Federal rules were expanded, OSM has not issued any new program deficiency letters [30 CFR 732].

The status of the Wyoming program deficiencies remains unchanged based on the results from CFO's review of each deficiency. However, the State will be made aware of those Federal rule changes that further define, or revise the Federal requirements.

Non-Significant Program Deficiencies

A review of each program deficiency is underway. The review will be completed during EY2001. Each proposed amendment package will be reviewed before the State begins it rule making process. The first amendment package to be reviewed is

Hydrology. No program deficiencies have been identified as non-significant. LQD asked that CFO not consider the Roads or Solid Waste amendments, because they are already in the rule making process. The remaining 4 amendment packages will be reviewed in the order in which they are scheduled to be submitted to OSM.

On April 4, 2000, WRCC Regional Director met with the Director of DEQ. The Directors discussed OSM's concerns regarding the lack of progress in submitting program amendments and the efforts LQD.

Schedules have been delayed due to industry comments on amendment packages, and required changes to amendments by the Land Quality Advisory Board and Environmental Quality Council to proposed amendment packages. For example, the Solid Waste amendment package has been before the Board four times (February 1994, October 1994, June 1998, and July 1999) and Council once (May 2000), where it was referred back to the Board for a fifth time. On August 1, 2000, the Board Passed the Solid Waste amendment and also passed the Roads amendment that has been in the State's rule making process since 1990. The Board inquired as to OSM's concerns regarding these amendments. OSM staff pointed out the regulations and the cooperative agreement require the State to maintain its coal regulatory program no less effective then the Federal program. Both Amendment packages will be processed and go before the Council for its approval. The earliest that the Council could review the amendments would be the forth quarterly meeting in 2000.

In addition to the Roads and Solid Waste, there are five (5) more amendments that need to be prepared and submitted to OSM..

Contemporaneous Reclamation

In response to 1997's evaluation of contemporaneous reclamation, the State agreed to contact the permittee and require changes to the format of data reported in the permit's annual report. The State contacted all the coal operators in January 1998 and required changes to the Annual Report format. In addition, the State agreed to review all permits and assure that the permits contained clearly outlined standards for contemporaneous reclamation. During the EY 2000 evaluation, CFO reviewed all of the Annual reports to verify that the coal operators were adopting the new format. Approximately 40 percent (14 out of 34) of permits did not contain the information required by LQD. However, 11 of the 14 permit were not due until after the evaluation was completed. Those eleven permits will have to be checked in the next evaluation period.

Inspection and Enforcement

Five random sample inspections (RSI) were conducted during FY-2000. One Ten-Day-Notice (TDN) was issued as a result of an RSI. Two TDN's were issued as a result of citizens complaints for failure to replace domestic water wells. The States response to one citizen complaint TDN was determined appropriate. The permittee agreed to drill a well for the citizen who submitted the complaint. The States response to the other TDN stated that the age and condition of the well was at fault for failure and not the coal company permittee. This response was determined inappropriate. This determination was appealed to the OSM Western Regional Coordinating Center (WRCC). The WRCC upheld the Casper Field Office Director's inappropriate determination and ordered a Federal inspection. As a result of the inspection a Federal Notice of Violation (NOV) was issued. The NOV was issued for failure to replace a domestic water well which was determined to be adversely affected by mining. The corrective action ordered by the NOV was to replace the well. The permittee filed a motion for temporary relief from the corrective actions ordered in the NOV. The Administrative Law Judge granted the request for temporary relief. The Department of Interior Solicitors office and the WRCC in Denver has entered into a settlement agreement with the permittee, Arch Coal Company. The agreement states that the NOV will be vacated upon notification by the citizen that her well has been replaced. The well has been drilled but the quality of water needed for household use has not been produced. A motion has been filed by DOI Solicitors to vacate the ALJ hearing.

One TDN was issued for failure of the permittee to obtain Secretary of the Interior approval prior to mining federal coal. The States response stated that it lacked jurisdiction in this matter. The Casper Field Office Director determined the States response to be appropriate.

One TDN was issued as a result of a joint bond release inspection on Federal lands. The TDN was issued for failure to repair erosion. The States response was to issue a State NOV. The States response was determined appropriate requiring no further action by the Casper Field Office.

Financial Administration (Grants)

CFO conducted financial oversight during the evaluation period. CFO visited DEQ offices in Cheyenne, Wyoming and reviewed financial information. Specifically, drawdowns, timeliness of grant applications and reports, audits, accounting, property and travel were reviewed.

A drawdown analysis was conducted for the existing Administration and Enforcement grant. Four drawdowns made on the existing grant were sampled and reviewed. Each drawdown was done after the respective expense incurred and the draw was for the proper amount. No problems were found.

Wyoming was timely regarding both reporting financial status of existing grants and filing of grant applications.

An A-133 Audit was completed for the year ended June 30, 1999. There were no findings regarding the Administration and Enforcement grant. For the previous year ended June 30, 1998 there was one finding regarding Wyoming's enforcement grant. There was one overdraw of funds from the U. S. Treasuryand this had been found and reported by OSM. Wyoming DEQ has submitted a resolution to the Environmental Protection Agency - Wyoming's cognizant agency, and these will be forwarded to OSM. There are no other outstanding findings. Wyoming intends to complete another A-133 Audit on or before December 31, 2000 for the year ended June 30, 2000.

Personnel time sheets and specific travel were sampled for purposes of ensuring that when inspectors were conduction inspections (coal and non-coal) that they were charging to the coal grant; if the trip involved both coal and non-coal inspections that time was appropriately charged to coal and non-coal accounts. No problems were found.

Travel policies and procedures were reviewed. They were found to be adequate. Travel vouchers were sampled. Allowable per diem daily rates and mileage were reviewed. No problems were found. Several instances were found where the coal grant was charged for the entire trip when coal and non-coal functions had transpired. Also one voucher had been charged and approved where the charge should have been less. Wyoming has since made corrections to these findings. All vouchers had been approved by the appropriate supervisor. No other problems were found.

Wyoming DEQ was conducting a property review. This meets the requirement of the Common Rule. The current reported OSM-60 for the Administration and Enforcement grant has fewer than fifty items. Wyoming continues to update their OSM-60's.

Appendix A:

Tabular Summary of Core Data to Characterize the Program

TABLE 1

COAL PRODUCTION (Millions of short tons)			
Period	Surface mines	Underground mines	Total
Coal production[A] for entire State:			
Annual Period			
1998	278.7	2.3	281.0
1999	322.3	1.8	324.1
2000	335.3	1.9	337.2

[A] Coal production as reported in this table is the gross tonnage which includes coal that is sold, used or transferred as reported to OSM by each mining company on form OSM-1 line 8(a). Gross tonnage does not provide for a moisture reduction. OSM verifies tonnage reported through routine auditing of mining companies. This production may vary from that reported by States or other sources due to varying methods of determining and reporting coal production.

TABLE 2

INSPECTABLE UNITS
As of September 30, 2000

Coal mines and related facilities	Number and status of permits								Insp. Unit[D]	Permitted acreage[A]		
	Active or temporarily inactive		Inactive		Abandoned		Totals					
			Phase II bond release									
	IP	PP	IP	PP	IP	PP	IP	PP		IP	PP	Total
STATE and PRIVATE LANDS	**REGULATORY AUTHORITY: STATE**											
Surface mines	0	33	0	0	0	0	0	33	33	0	122,695	122,695
Underground mines	0	3	0	0	0	0	0	3	3	0	4,260	4,260
Other facilities	0	2	0	0	0	0	0	2	2	0	430	430
Subtotals	0	38	0	0	0	0	0	38	38	0	127,385	127,385
FEDERAL LANDS	**REGULATORY AUTHORITY: STATE**											
Surface mines	0	33	0	0	0	0	0	33	33	0	206,476	206,476
Underground mines	0	2	0	0	0	0	0	2	2	0	1,911	1,911
Other facilities	0	2	0	0	0	0	0	2	2	0	1,673	1,673
Subtotals	0	37	0	0	0	0	0	37	37	0	210,060	210,060
ALL LANDS[B]												
Surface mines	0	34	0	0	0	0	0	34	34	0	329,176	329,176
Underground mines	0	3	0	0	0	0	0	3	3	0	6,171	6,171
Other facilities	0	2	0	0	0	0	0	2	2	0	2,103	2,103
Totals	**0**	**39**	**0**	**0**	**0**	**0**	**0**	**39**	**39**	**0**	**337,445**	**337,445**

Average number of permits per inspectable unit (excluding exploration sites) 1

Average number of acres per inspectable unit (excluding exploration sites) 8652

Number of exploration permits on State and private lands: .. 0 On Federal lands: 0 [C]

Number of exploration notices on State and private lands: .. 1 On Federal lands: 0 [C]

IP: Initial regulatory program sites.
PP: Permanent regulatory program sites.

[A] When a unit is located on more than one type of land, includes only the acreage located on the indicated type of land.

[B] Numbers of units may not equal the sum of the three preceding categories because a single inspectable unit may include lands in more than one of the preceding categories.

[C] Includes only exploration activities regulated by the State pursuant to a cooperative agreement with OSM or by OSM pursuant to a Federal lands program. Excludes exploration regulated by the Bureau of Land Management.

[D] Inspectable Units includes multiple permits that have been grouped together as one unit for inspection frequency purposes by some State programs.

TABLE 3

STATE PERMITTING ACTIVITY
As of September 30, 2000

Type of application	Surface mines			Underground mines			Other facilities			Totals		
	App. Rec.	Issued	Acres	App. Rec.	Issued	Acres[A]	App. Rec.	Issued	Acres	App. Rec.	Issued	Acres
New permits	1	0	0	0	0	0	0	0	0	1	0	0
Renewals	15	11	0	0	0	0	0	0	0	15	11	0
Transfers, sales and assignments of permit rights	6	4		1	1		0	0		7	5	
Small operator assistance	0	0		0	0		0	0		0	0	
Exploration permits	0	0		0	0		0	0		0	0	
Exploration notices[B]	1	1			0			0		1	1	
Revisions (exclusive of incidental boundary revisions [C]	100	117	8255	10	7	0		0		110	124	8255
Incidental boundary revisions		4	172		0	0		0	0		4	172
Totals	123	137	8,427	11	8	0	0	0	0	134	145	8,427

OPTIONAL - Number of midterm permit reviews completed that are not reported as revisions 0

[A] Includes only the number of acres of proposed surface disturbance.

[B] State approval not required. Involves removal of less than 250 tons of coal and does not affect lands designated unsuitable for mining.

[C] State revision process includes "amendments" where additional acreage is added to the permit as a permit revision.

TABLE 4

OFF-SITE IMPACTS

DEGREE OF IMPACT		RESOURCES AFFECTED												Total
		People			Land			Water			Structures			
		minor	moderate	major	minor	moderate	major	minor	moderate	major	minor	moderate	major	
TYPE OF IMPACT	Blasting													
	Land Stability													
	Hydrology			2						2			2	2
	Encroachment													
	Other (Dust & Smoke)													
	Total	0	0	2	0	0	0	0	0	2	0	0	2	2

Total number of inspectable units: 39
Inspectable units free of off-site impacts: 37

OFF-SITE IMPACTS ON BOND FORFEITURE SITES

DEGREE OF IMPACT		RESOURCES AFFECTED												Total
		People			Land			Water			Structures			
		minor	moderate	major	minor	moderate	major	minor	moderate	major	minor	moderate	major	
TYPE OF IMPACT	Blasting													
	Land Stability													
	Hydrology													
	Encroachment													
	Other													
	Total	0	0	0	0	0	0	0	0	0	0	0	0	

Total number of inspectable units: 1
Inspectable units free of off-site impacts: 1

Refer to the report narrative for complete explanation and evaluation of the information provided by this table.

TABLE 5

ANNUAL STATE MINING AND RECLAMATION RESULTS		
Bond release phase	**Applicable performance standard**	**Acreage released during this evaluation period**
Phase I	! Approximate original contour restored ! Topsoil or approved alternative replaced	143
Phase II	! Surface stability ! Establishment of vegetation	2692
Phase III	! Post-mining land use/productivity restored ! Successful permanent vegetation ! Groundwater recharge, quality and quantity restored ! Surface water quality and quantity restored	33.4
	Bonded Acreage Status[A]	**Acres**
	Total number of bonded acres at end of last review period (September 30, 1999)[B]	337,445
	Total number of bonded acres during this evaluation year	8,427
	Number of acres bonded during this evaluation year that are considered remining, if available	0
	Number of acres where bond was forfeited during this evaluation year (also report this acreage on Table 7)	3

[A] Bonded acreage is considered to approximate and represent the number of acres disturbed by surface coal mining and reclamation operations.

[B] Bonded acres in this category are those that have not received a Phase III or other final bond release (State maintains jurisdiction).

TABLE 6

MINE RELATED DISTURBANCES AND RECLAMATION AT WYOMING MINE SITES (YEAR BY YEAR)					
REPORT PERIOD	ACRES OF TOTAL MINE DISTURBANCE DURING REPORT PERIOD	ACRES OF CONSTRUCTED SUPPORT AREAS (FACILITIES, STOCKPILE, ROADS, ETC)	ACRES OF NET DISTURBANCE MINUS THE SUPPORT AREAS DURING REPORT PERIOD	ACRES OF PERMANENT RECLAMATION DURING REPORT PERIOD	RATIO OF RECL. VS. NET DIST.
1986	3152	492	2660	1456	0.55
1987	2521	439	2082	1630	0.78
1988	2610	606	2004	1355	0.68
1989	2967	580	2387	994	0.42
1990	2833	377	2456	1068	0.43
1991	2807	953	1854	1517	0.82
1992	2919	1167	1752	1641	0.94
1993	3173	754	2419	1888	0.78
1994	3327	1042	2285	1219	0.53
1995	3873	1278	2595	1234	0.48
1996	3954	1321	2633	1311	0.50
1997	3613	872	2741	1098	0.40
1998	4303	993	3210	1973	0.60
1999	3868	679	3189	3541	1.11
2000	5185	1232	3953	3174	0.80

TABLE 7

STATE BOND FORFEITURE ACTIVITY

(Permanent Program Permits)

	Number of Sites	Dollars	Disturbed Acres
Bonds forfeited as of September 30, 1999 [A]	1	$36,407	3
Bonds forfeited during EY 2000	1	$36,407	3
Forfeited bonds collected as September 30, 1999 [A]	1	$36,602	3
Forfeited bonds collected during EY 2000	1	$36,602	3
Forfeiture sites reclaimed during EY 2000	0	0 [B]	0
Forfeiture sites repermitted during EY 2000	0		0
Forfeiture sites unreclaimed as of September 30, 2000	1		1
Excess reclamation costs recovered from permittee	0	0	
Excess forfeiture proceeds returned to permittee	0	0	

[A] Includes data only for those forfeiture sites not fully reclaimed as of this date.

[B] Cost of reclamation, excluding general administrative expenses.

TABLE 8

STATE STAFFING
(Full-time equivalents at end of evaluation year)

Function	EY 2000
Regulatory Program	
Permit review	14.48
Inspection	8.35
Other (administrative, fiscal, personnel, etc.)	6.17
SUB-TOTAL	29.00
AML Program	13.10
TOTAL	42.10

TABLE 9

FUNDS GRANTED TO WYOMING BY OSM (Millions of dollars) EY 2000		
Type of Grant	**Federal Funds Awarded**	**Federal Funding as a Percentage of Total Program Costs**
Administration and enforcement	$1,540,643	88..7 %
Small operator assistance	0	0
Totals	$1,540,643	

TABLE 10

STATE OF WYOMING INSPECTION ACTIVITY PERIOD: October 1, 1999 - September 30, 2000		
Inspectable Unit Status	Number of Inspections Conducted	
	Partial	Complete
Active*	285	120
Inactive*	86	37
Abandoned*	0	0
Exploration	0	0
TOTAL	371	157

* Use terms as defined by the approved State program.

TABLE 11

STATE OF WYOMING ENFORCEMENT ACTIVITY PERIOD: October 1, 1999 - September 30, 2000		
Type of Enforcement Action	Number of Actions*	Number of Violations*
Notice of Violation	8	8
Failure-to-Abate Cessation Order	0	0
Imminent Harm Cessation Order	0	0

* Do not include those violations that were vacated.

TABLE 12

LANDS UNSUITABLE ACTIVITY STATE OF WYOMING PERIOD: October 1, 1999 - September 30, 2000			
Number of Petitions Received	0		
Number of Petitions Accepted	0		
Number of Petitions Rejected	0		
Number of Decisions Declaring Lands Unsuitable	0	Acreage Declared as Being Unsuitable	0
Number of Decisions Denying Lands Unsuitable	0	Acreage Denied as Being Unsuitable	0

Appendix B:

State Comments on the Report

Wyoming, December 7, 2000

(E-mail from Richard Chancellor (LQD) to Mark Humphrey (OSM) received December 5, 2000)

MEMORANDUM

TO: Mark Humphrey

FROM: Richard A. Chancellor

DATE: 5 December 2000

SUBJECT: Annual Evaluation Summary Report EY2000

I have reviewed the draft report and only have two comments. Both refer to section II. Overview of the Wyoming Coal Mining Industry. The comments are:

1. On the top of page 3, the paragraph reads:

   Kennecott's Jacobs Ranch mine has the northern and southern leases and Arch's Black Thunder mine has the third lease. R2P2 have been approved for the Kennecott's southern and Arch's lease. BLM is processing Kennecott's northern lease.

The eastern edge of the Thundercloud lease that is contained within the boundary of the Jacobs Ranch mine was split into a northern and southern lease. R2P2's for both leases have been approved. Likewise, the southern segment of the Thundercloud lease that is contained within the current Black Thunder permit boundary was split into a separate lease. The R2P2 for this lease was also approved.

2. Third paragraph on page 3. You may want to add: The Wyodak Mine is consolidating the East Gillette and Clovis Point permits into the Wyodak permit.

Wyoming, December 7, 2000

Appendix C:

CFO Response to State Comments

Wyoming, December 7, 2000

CFO Response to State Comments

LQD COMMENT:

I have reviewed the draft report and only have two comments. Both refer to section II. Overview of the Wyoming Coal Mining Industry. The comments are:

1. On the top of page 3, the paragraph reads:

   Kennecott's Jacobs Ranch mine has the northern and southern leases and Arch's Black Thunder mine has the third lease. R2P2 have been approved for the Kennecott's southern and Arch's lease. BLM is processing Kennecott's northern lease.

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CFO RESPONSE:

CFO has made the correction and appreciates LQD's input.

LQD COMMENT:

2. Third paragraph on page 3. You may want to add: The Wyodak Mine is consolidating the East Gillette and Clovis Point permits into the Wyodak permit.

CFO RESPONSE:

CFO has made the correction and appreciates LQD's input.

Wyoming, December 7, 2000

Exhibit 6

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

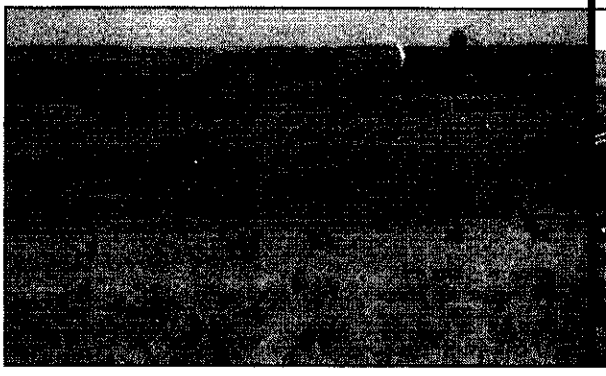
BLM

FINAL
Environmental Impact Statement for the Wright Area Coal Lease Applications

Volume 1 of 2
Chapters 1 - 4

West Loadout Facilities
Black Thunder Mine, Wyoming

Elk on Reclaimed Rangeland
Jacobs Ranch Mine, Wyoming



Elk on Reclaimed Rangeland
Black Thunder Mine, Wyoming

Loadout Facilities in Porcupine Creek Valley
North Antelope Rochelle Mine, Wyoming

Wyoming State Office – High Plains District

NATIONAL SYSTEM OF PUBLIC LANDS

July 2010

The BLM manages more land – 253 million acres – than any other Federal agency. This land, known as the National System of Public Lands, is primarily located in 12 Western States, including Alaska. The Bureau, with a budget of about $1 billion, also administers 700 million acres of sub-surface mineral estate throughout the nation. The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

BLM/WY/PL-10/022+1320

WRIGHT AREA COAL LEASE APPLICATIONS
FINAL ENVIROMENTAL IMPACT STATEMENT

Prepared by

WWC Engineering
Sheridan, Wyoming

Under the Direction of

U.S. Department of the Interior
Bureau of Land Management
High Plains District Office
Casper, Wyoming

and

Cooperating Agencies

U.S. Department of the Interior
Office of Surface Mining
Reclamation and Enforcement
Denver, Colorado

U.S. Department of Agriculture
Forest Service
Medicine Bow-Routt National Forests and
Thunder Basin National Grassland
Douglas, Wyoming

Wyoming Department of Environmental Quality
Land Quality and Air Quality Divisions
Cheyenne, Wyoming

Wyoming Department of Transportation
Cheyenne, Wyoming

Converse County Board of Commissioners
Douglas, Wyoming

July 2010

FINAL ENVIRONMENTAL IMPACT STATEMENT
WRIGHT AREA COAL LEASE APPLICATIONS
CAMPBELL COUNTY, WYOMING
ABSTRACT

Lead Agency: USDI, Bureau of Land Management, High Plains District Office, Casper, Wyoming

Cooperating Agencies: USDI, Office of Surface Mining Reclamation and Enforcement, Denver, Colorado

USDA, Forest Service, Medicine Bow-Routt National Forests and Thunder Basin National Grassland, Douglas, Wyoming

Wyoming Department of Environmental Quality, Land Quality and Air Quality Divisions, Cheyenne, Wyoming

Wyoming Department of Transportation, Cheyenne, Wyoming

Converse County Board of Commissioners, Douglas, Wyoming

For Further Information Contact: Sarah Bucklin, Bureau of Land Management, 2987 Prospector Drive, Casper, WY 82604; (307) 261-7541

This Final Environmental Impact Statement (EIS) assesses the environmental consequences of decisions to hold competitive, sealed-bid sales and issue leases for six federal coal maintenance tracts in Campbell County, Wyoming as a result of coal lease applications submitted by Ark Land Company, Jacobs Ranch Coal Company, and BTU Western Resources, Inc. As applied for, the Wright area coal lease-by-application (LBA) tracts include approximately 18,021.73 acres containing approximately 2.570 billion tons of federal coal. The tracts are referred to as the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine. The applicants propose to mine the tracts as maintenance leases for the existing adjacent mines, if lease sales are held and the applicant mines acquire the leases. At the time of application, the adjacent mines included Black Thunder, Jacobs Ranch, and North Antelope Rochelle.

This Final EIS describes the physical, biological, cultural, historic, and socioeconomic resources in and around the existing mines and the LBA tracts. The alternatives in the Final EIS consider the impacts of leasing the tracts as applied for, leasing reconfigured tracts in order to avoid bypassing federal coal or to increase competitive interest in the tracts, and not leasing the tracts. The focus for the impact analysis was based on resource issues and concerns identified during previous coal leasing analyses and public scoping conducted for these lease applications. Recent concerns related to leasing coal and its subsequent development include: impacts to groundwater, air quality, wildlife, cultural resources, paleontological resources, socioeconomics, loss of livestock grazing areas, conflicts with oil and gas development, cumulative impacts related to ongoing surface coal mining and other proposed development in the Wyoming Powder River Basin, greenhouse gas emissions, ozone, and climate change.

This Final EIS, in compliance with Section 7(c) of the Endangered Species Act as amended, identifies any endangered or threatened species which are likely to be affected by the Proposed Action.

The Final EIS is open for a 30-day review period beginning on the date that the U.S. Environmental Protection Agency publishes the Notice of Availability in the *Federal Register*. Comments that are postmarked or received on or before the end of the 30-day review period will be considered in the preparation of the Record of Decision.

mines. WDEQ/AQD requires the collection of information documenting the quality of the air resource at each of the PRB mines. A discussion of the monitoring network, monitoring requirements, the data that have been collected, and PM_{10} concentration trends since monitoring began are included in Appendix F.

WDEQ/AQD's Ambient Air Monitoring Annual Network Plan provides an overview of the number and types of air quality monitors AQD runs or oversees within the state of Wyoming, and is available for review on its website at: http://deq.state.wy.us/aqd/downloads/AirMonitor/Network%20Plan_2008.pdf

3.4.3 Emissions of Nitrogen Oxides (NO_X) and Ozone (O_3)

3.4.3.1 Affected Environment for NO_X and O_3 Emissions

Gases that contain nitrogen and oxygen in varying amounts are referred to as nitrogen oxides (NO_X). One type of NO_X, nitrogen dioxide (NO_2), is a highly reactive, reddish brown gas that is heavier than air and has a pungent odor. NO_2 is by far the most toxic of several species of NO_X. NO_2 can combine with atmospheric moisture to form nitric acid and nitric oxide. Because several NO_X species can be chemically converted to NO_2 in the atmosphere, NO_2 emissions control is focused on all NO_X species, while the ambient standard is expressed in terms of NO_2. O_3 has been included in discussions on emissions of NO_X since NO_X is one of the main ingredients involved in the formation of ground level O_3. Ground-level O_3 is not emitted directly into the air, but is created by chemical reactions between NO_X and VOCs in the presence of sunlight.

According to the EPA (EPA 2001a):

- NO_2 may cause significant toxicity because of its ability to form nitric acid with water in the eye, lung, mucous membranes, and skin.
- Acute exposure to NO_2 may cause death by damaging the pulmonary system.
- Chronic or repeated exposure to lower concentrations of NO_2 may exacerbate pre-existing respiratory conditions, or increase the incidence of respiratory infections.

Nitrogen oxides form when fuel is burned at high temperatures. They can be formed naturally or by human activities. The primary manmade sources are motor vehicles, electric utilities, and other fuel-burning sources. According to EPA, in 2002, all motor vehicles (including non-road equipment) produced about 60 percent of the manmade NO_X emissions, utilities produced approximately 22 percent of the emissions, industrial/commercial/residential activities produced about 17 percent of the manmade NO_X emissions, and other sources accounted for the remaining 1 percent of the manmade emissions (EPA 2009b).

The primary direct source of emissions of nitrogen oxides during coal mining operations is tailpipe emissions from large mining equipment and other vehicle traffic inside the mine permit area. Blasting that is done to assist in the removal of material overlying the coal (the overburden) can result in emissions of several products, including NO_2, as a result of the incomplete combustion of nitrogen-based explosives used in the blasting process. When this occurs, gaseous, orange-colored clouds may be formed and they can drift or be blown off mine permit areas.

Incomplete combustion during blasting may be caused by wet conditions in the overburden, incompetent or fractured geological formations, deformation of boreholes, and blasting agent factors. The rate of release is not well known but is believed to be dependent on a wide number of factors that likely include, but are not necessarily limited to: downhole confinement; downhole moisture; type/blend of ammonium nitrate, fuel oil (ANFO) and emulsion; and detonation velocity. Generally, blasting-related NO_X emissions are more prevalent at operations that use the blasting technique referred to as cast blasting. Cast blasting refers to a type of blasting in which the blast is designed to directly cast the overburden from on top of the coal into the previously mined area. All three of the applicant mines employ cast blasting.

O_3 has the same chemical structure whether it occurs miles above the earth or at ground level and can be "good" or "bad", depending on its location in the atmosphere. In the earth's lower atmosphere, ground-level O_3 is considered "bad." Motor vehicle exhaust and emissions from industrial sources contain NO_X and in the presence of VOCs react to form ground-level O_3. Ground-level O_3 is the primary constituent of smog. Many urban areas tend to have high levels of "bad" O_3, but even rural areas are also subject to increased O_3 levels because wind carries O_3 and pollutants that form it hundreds of miles away from their original sources.

Under the Clean Air Act, EPA has set protective health-based standards for O_3 in the air we breathe. Prior to May 27, 2008, the NAAQS 8-hour standard for O_3 was 0.080 parts per million (ppm) (157 $\mu g/m^3$). Effective May 27, 2008, the 8-hour standard was revised by EPA to 0.075 ppm (147 $\mu g/m^3$). Ozone monitoring is not required by WDEQ/AQD at the PRB coal mines, but levels have been monitored by WDEQ/AQD at its ambient air quality monitoring sites in the PRB since 2001 (Table 3-9). An exceedance of the O_3 8-hour standard occurs if the 4th-highest daily maximum value is above the level of the standard.

3.4.3.1.1 Site Specific NO_X and O_3 Emissions

Sources of fugitive NO_X emissions at the Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines include overburden and coal blasting events, tailpipe emissions from the mining equipment, and emissions from the trains used to transport the coal away from the mines. NO_X point sources at the

Table 3-9. 2001 Through 2008 Annual 4th Max, 8-Hour Average Ozone Values (ppm).

Site Address	2001	2002	2003	2004	2005	2006	2007	2008
TBNG	0.069	0.071	0.074	0.065	0.063	0.072	0.072	0.074
Campbell County	--	--	0.077	0.061	0.063	0.065	0.072	0.064

Monitor values from EPA (2009a)
Pre-May 27, 2008, 8-Hour O_3 NAAQS = 0.080 ppm
Post-May 27, 2008, 8-Hour O_3 NAAQS = 0.075 ppm

mines could include stationary engines, coal-fired hot water generators, and natural-gas fired heaters.

To date, there have been no reported events of public exposure to NO_2 from blasting activities at the Jacobs Ranch and North Antelope Rochelle mines. The WDEQ has not required the mines to implement any specific measures to control or limit public exposure to NO_2 from blasting, although the mines have instituted voluntary blasting restrictions to avoid NO_X impact to the public, which are discussed in more detail in Section 3.4.3.3. Black Thunder Mine received several reports of public exposure to NO_2 from blasting prior to 2001. Measures to control or limit future such incidences, which are part of Black Thunder Mine's settlement agreement, have been instituted when large overburden blasts are planned at that mine, and those measures are discussed in Section 3.4.3.3.

Table 3-9 shows that no exceedances of the O_3 standard have occurred at either of the two monitoring sites if evaluated under the standard in place at the time the values were recorded. If the strengthened 2008 standard was applied retroactively, one exceedance would have occurred (in 2003 at the Campbell County site). BLM expects a stricter O_3 standard of between 0.06 and 0.07 ppm to be announced in August 2010 (Zachariassen 2010).

3.4.3.2 Environmental Consequences Related to Short-Term NO_X Emissions

There are various compounds and derivatives in the family of nitrogen oxides, including NO_2, nitric acid, nitrous oxide, nitrates, and nitric oxide, which may cause a wide variety of health and environmental impacts. According to EPA, the main causes of concern with respect to NO_X are:

- it is one of the main reactants involved in the formation of ground level ozone, which can trigger serious respiratory problems;
- it reacts to form nitrate particles, acid aerosols, as well as NO_2, which also cause respiratory problems;
- it contributes to the formation of acid rain;
- it contributes to nutrient overload that deteriorates water quality;
- it contributes to atmospheric particles that cause visibility impairment, most noticeably in national parks;
- it reacts to form toxic chemicals;

- one member of the NO_X family, nitrous oxide or N_2O, is a greenhouse gas that contributes to global warming; and
- it can be transported over long distances (EPA 2009b).

Potential health risks associated with inhalation of ground level ozone and NO_X related particles include acute respiratory problems, aggravated asthma, decreases in lung capacity in some healthy adults, inflammation of lung tissue, respiratory-related hospital admissions and emergency room visits, and increased susceptibility to respiratory illnesses, including bronchitis and pneumonia (EPA 2007b).

According to EPA, "...the exact concentrations at which NO_2 will cause various health effects cannot be predicted with complete accuracy because the effects are a function of air concentration and time of exposure, and precise measurements have not been made in association with human toxicity. The information that is available from human exposures also suggests that there is some variation in individual response" (EPA 2001a). WDEQ has yet not established a WAAQS for NO_2 for averaging times shorter than one year. EPA recently set a 1-hour NO_2 NAAQS at 100 parts per billion (ppb) effective January 22, 2010.

While extensive expert testimony was provided to the Wyoming Environmental Quality Council (EQC) during hearings in 2002 arguing for the establishment of a de facto "standard" ranging from 0.5 to 5.0 ppm for a 10-minute exposure, the EQC determined there was insufficient evidence to establish a short-term exposure limit and concluded additional study was required. The primary control measure for mitigating exposures to offsite residences is to avoid overburden cast blasting when wind direction or atmospheric conditions are unfavorable. Such approaches are employed at the Black Thunder, Jacobs Ranch, and North Antelope Rochelle Mines and will continue to be employed. Studies that have been conducted to evaluate NO_2 exposures from blast clouds in the PRB are described in Appendix F.

Although there is no NAAQS that regulates short-term NO_2 levels, there is concern about the potential health risk associated with short-term exposure to NO_2 from blasting emissions. The National Institute of Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), and EPA have identified the following short-term exposure criteria for NO_2:

- NIOSH's recommended Immediately Dangerous to Life and Health level is 20.0 ppm (37,600 $\mu g/m^3$);
- EPA's Significant Harm Level, a 1-hour average, is 2.0 ppm (3,760 $\mu g/m^3$);
- OSHA's Short-Term Exposure Limit, a 15-minute time-weighted average, which was developed for workers, is 5.0 ppm (9,400 $\mu g/m^3$), which must not be exceeded during any part of the workday, as measured instantaneously;

- NIOSH's recommendation for workers is a limit of 1.0 ppm (1,880 μg/m^3) based on a 15-minute exposure that should not be exceeded at any time during the workday; and
- EPA recommends that concentrations not exceed 0.5 ppm (940 μg/m^3) for a 10-minute exposure to protect sensitive members of the public (EPA 2003a).

The Black Thunder Mine also conducted a study designed to provide information on safe setback distances for blasting activities at that mine (TBCC 2002). Monitors for that study were located close to blasts in order to collect data for a modeling project; they were located within the mine permit boundary in areas that are not and would not be accessible to the public during mining operations and these areas are also cleared of employees during blasting. The measured NO_X levels ranged from non-detectable to 21.4 ppm. The highest value was measured 361 feet from the blast.

Blast clouds are of a short-term, transient nature. While disagreement still exists regarding acceptable exposure levels, a large amount of actual data are now available from which informed decisions can be made regarding blasting practices. The data show clearly that reduction in blast (agent) size and increases in setback distances are effective methods for mitigating the frequency and extent of public exposure to blasting clouds. See Appendix F for additional information about studies that were conducted to evaluate the levels of public exposure to NO_X.

3.4.3.2.1 Proposed Action and Alternatives 2 and 3

Potential NO_X emissions related to mining operations at the existing Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines are described below. Due to the similarities in mining rates and mining operations, the potential impacts of mining the LBA tracts have been inferred from the projected impacts of mining the existing coal leases as currently permitted.

WDEQ/AQD has determined that an assessment of annual NO_X impacts must be included as part of an air quality permitting analysis for new surface coal mines and existing mine plan revisions. As discussed in Section 3.4.2.2.1, the applicant mines conducted modeling analyses for PM_{10} and NO_X for a maximum projected coal production rate as part of their air quality permit applications. Receptor locations were placed at approximately 500-meter intervals along the mines' LNCM boundaries. The regional background NO_X annual concentration used for the Black Thunder and Jacobs Ranch Mines was 14.0 μg/m^3, while the North Antelope Rochelle Mine used a regional background concentration of 20.0 μg/m^3. Pursuant to WDEQ/AQD requirements, emissions from all stationary engines, coal-fired hot water generators, and natural-gas fired heaters, which are considered to be NO_X point sources at the mine, were considered in the inventory. Additional mobile sources were added to describe the railroad locomotives and large mining equipment on each mine site.

The estimated average overburden thickness is generally greater in each of the LBA tracts than within the current leases, but the thickness of the coal is about the same as in the existing mine areas (Table 3-7). If the Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines acquire the LBA tracts, there are no plans to change blasting procedures or blast sizes associated with the mining of the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts. However, if the average annual rates of production are maintained, there would potentially be an increase in the frequency of blasting in order to remove the additional volume of overburden overlying the coal.

If the Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines acquire the LBA tracts, they will have to amend their current air quality permits to include the new leases before mining activities can proceed into the new lease areas. Current mining and mitigation methods to recover the coal in the LBA tracts would be expected to continue for a longer period of time than is shown in the mines' current air quality permits. The mines would continue to use cast blasting, and there are currently no plans to change blasting procedures or blast sizes associated with mining of the LBA tracts. According to WDEQ, permit conditions designed to control or limit public exposure to NO_2 and flyrock from blasting operations would be no less stringent for mining operations on the LBA tracts than the permit conditions that are in place for blasting operations on the existing Black Thunder, Jacobs Ranch, and North Antelope Rochelle Mine leases (Emme 2007).

3.4.3.2.1.1 North, South, and West Hilight Field LBA Tracts

The North, South, and West Hilight Field LBA Tracts would be mined as integral parts of the Black Thunder Mine under the Proposed Action and Alternatives 2 and 3.

As discussed in Section 3.4.2.2, WDEQ/AQD issued the most recent air quality permit, MD-3851, for the Black Thunder Mine on August 18, 2008, and the mine was required to conduct NO_2 dispersion modeling similar in scope to the PM_{10} analysis. Emission rates were determined for the same worst-case years used in the PM_{10} modeling. The amount of NO_2 emissions from blasting is related to the amount of ANFO utilized. NO_2 emission rates for 2015 and 2017 are expected to be 4,507 tpy and 4,743 tpy, respectively. NO_X modeling closely followed many of the same procedures used in the PM_{10} analysis. Emissions were apportioned in a similar manner and the same meteorological data set was used. Area source, haul road, and point source information for the Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines and information for railroads, roads, power plants, and regional sources provided by WDEQ/AQD were included in the model. Long-term modeling indicated the currently projected mine activities will be in compliance with the annual NO_X AAQS for the life of the Black Thunder Mine. For year 2015, the maximum annual NO_X concentration along the Black Thunder Mine LNCM boundary was 46.3 $\mu g/m^3$ and for year 2017, the maximum annual NO_X concentration along

the Black Thunder Mine LNCM boundary was 52.5 μg/m^3 (BTM 2008b). Coal production in both years was assumed to be the maximum permitted production level of 135 million tons. The locations of the maximum-modeled NO_X concentrations along the Black Thunder Mine LNCM boundary for 2015 and 2017 are shown on Figures 3-7 and 3-8, respectively.

Modeling conducted for the current Black Thunder Mine air quality permit projected no exceedances of the annual NO_2 NAAQS at the permitted production rate. TBCC estimates that the Black Thunder Mine would produce at an average rate of 135 mmtpy if it acquires and mines the North, South, and/or West Hilight Field LBA Tracts; therefore, air quality impacts that result from mining the LBA tracts should also be within annual NAAQS limits.

Public exposure to NO_X emissions caused by surface mining operations is most likely to occur along publicly accessible roads and highways that pass near and through the areas of mining operations. Occupants of dwellings in the area could also be affected. Roads, highways, currently occupied dwellings, businesses, and school bus stops in the vicinity of the North, South, and West Hilight Field LBA Tracts are shown in Figures 3-9 through 3-11, respectively.

3.4.3.2.1.2 West Jacobs Ranch LBA Tract

The West Jacobs Ranch LBA Tract would be mined as an integral part of the Jacobs Ranch Mine under the Proposed Action and Alternative 2.

As discussed in Section 3.4.2.2, WDEQ/AQD issued the most recent air quality permit, MD-1005A2, for the Jacobs Ranch Mine on January 22, 2007; however, NO_2 dispersion modeling for the mine is included in air quality permit MD-1005, issued August 6, 2004. Based on mine plan parameters and highest emissions inventories, the worst-case years of 2006 and 2013 were selected. The amount of NO_X emissions from blasting is related to the amount of ANFO utilized. NO_X emission rates for 2006 and 2013 were expected to be 1,447 tpy and 1,450 tpy, respectively. NO_X modeling closely followed many of the same procedures used in the PM_{10} analysis except for selecting different modeling years and different source areas. Area source, haul road, and point source information for the Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines and information for railroads, roads, power plants, and regional sources provided by WDEQ/AQD were included in the model. Long-term modeling indicated the currently projected mine activities will be in compliance with the annual NO_X AAQS for the life of the Jacobs Ranch Mine. For year 2006, the maximum annual NO_X concentration along the Jacobs Ranch Mine LNCM boundary was 50.0 μg/m^3 and for year 2013, the maximum annual NO_X concentration along the Jacobs Ranch Mine LNCM boundary was 55.0 μg/m^3 (JRM 2007). Coal production in both years was assumed to be the maximum permitted production level of 55 million tons. The locations of the maximum-modeled NO_X concentrations along the Jacobs Ranch Mine LNCM boundary for 2006 and 2013 are shown on Figure 3-18.

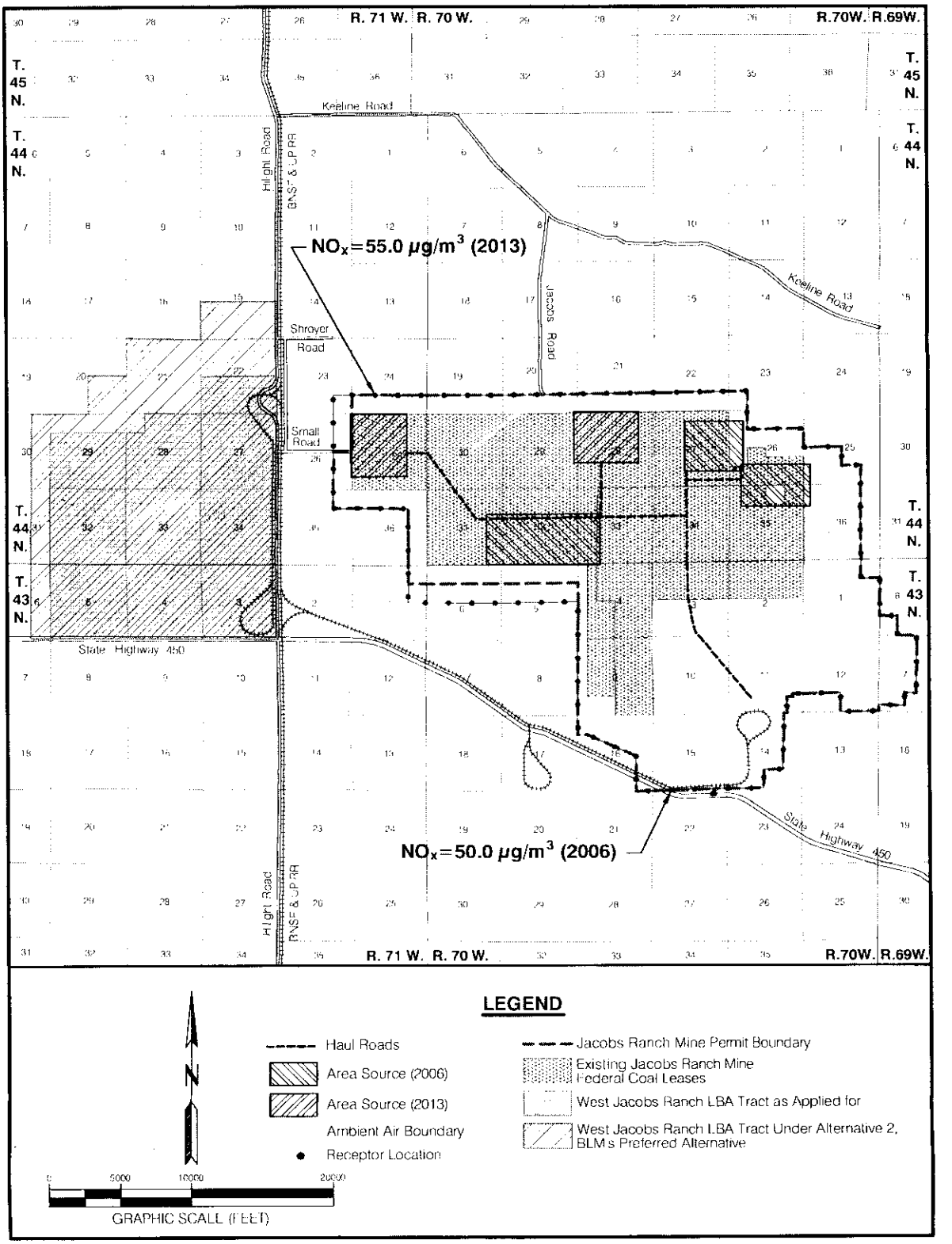


Figure 3-18. Maximum Modeled NO_X Concentrations at the Jacobs Ranch Mine Ambient Air Boundary for the Years 2006 and 2013.

Modeling conducted for the current Jacobs Ranch Mine air quality permit projected no exceedances of the annual NO_X NAAQS at the permitted production rate. TBCC estimates that the Jacobs Ranch Mine would produce at the current average rate of 40 mmtpy if it acquires and mines the West Jacobs Ranch LBA Tract; therefore, air quality impacts that result from mining the LBA tract should also be within annual NAAQS limits.

Public exposure to NO_X emissions caused by surface mining operations is most likely to occur along publicly accessible roads and highways that pass near and through the areas of mining operations. Occupants of dwellings in the area could also be affected. Roads, highways, currently occupied dwellings, businesses, and school bus stops in the vicinity of the West Jacobs Ranch LBA Tract are shown in Figure 3-13.

3.4.3.2.1.3 North and South Porcupine LBA Tracts

The North and South Porcupine LBA Tracts would be mined as integral parts of the North Antelope Rochelle Mine under the Proposed Action and Alternative 2.

As discussed in Section 3.4.2.2, WDEQ/AQD issued the most recent air quality permit, MD-6375, for the North Antelope Rochelle Mine on February 10, 2008, which modified air quality permit MD-1331 that was issued on March 7, 2006. The mine was required to conduct NO_2 dispersion modeling similar in scope to the PM_{10} analysis. Emission rates were determined for the same worst-case years used in the PM_{10} modeling. The amount of NO_X emissions from blasting is related to the amount of ANFO utilized. NO_X emission rates for 2012 and 2017 are expected to be 3,323 tpy and 3,856 tpy, respectively. NO_X modeling closely followed many of the same procedures used in the PM_{10} analysis. Emissions were apportioned in a similar manner and the same meteorological data set was used. Area source, haul road, and point source information for the North Antelope Rochelle, Black Thunder, Jacobs Ranch, North Rochelle (now part of the North Antelope Rochelle and Black Thunder mines), and Antelope mines and information for railroads, roads, power plants, and regional sources provided by WDEQ/AQD were included in the model. Long-term modeling indicated the currently projected mine activities will be in compliance with the annual NO_X AAQS for the life of the North Antelope Rochelle Mine. For year 2012, the maximum annual NO_X concentration along the North Antelope Rochelle Mine LNCM boundary was 50.6 $\mu g/m^3$ and for year 2017, the maximum annual NO_X concentration along the North Antelope Rochelle Mine LNCM boundary was 55.2 $\mu g/m^3$ (PRC 2008a). Coal production in both years was assumed to be the maximum permitted production level of 140 million tons. The locations of the maximum-modeled NO_X concentrations for 2012 and 2017 are shown on Figures 3-14 and 3-15, respectively. The potential NO_X impacts from mining the North and South Porcupine LBA Tracts have been inferred to be similar to the currently permitted impacts of mining the existing coal leases at the North Antelope Rochelle Mine because of the similarities in mining rates and mining operations.

Modeling conducted for the current North Antelope Rochelle Mine air quality permit projected no exceedances of the annual NO_X NAAQS at the permitted production rate. PRC estimates that the North Antelope Rochelle Mine would continue to produce at the an average rate of 95 mmtpy if it acquires and mines the North and/or South Porcupine LBA Tracts; therefore, air quality impacts that result from mining the LBA tract should also be within annual NAAQS limits.

Public exposure to NO_X emissions caused by surface mining operations is most likely to occur along publicly accessible roads and highways that pass near and through the areas of mining operations. Occupants of dwellings in the area could also be affected. Roads, highways, currently occupied dwellings, and businesses in the vicinity of the North and South Porcupine LBA Tract are shown in Figures 3-16 and 3-17, respectively.

3.4.3.2.2 No Action Alternative

Under the No Action Alternative, the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine coal lease applications would be rejected and coal removal and projected impacts related to NO_X emissions discussed above would not occur on the portions of the LBA tracts as applied for or the LBA tracts configured under Alternative 2 that will not be disturbed under the currently approved mining and air quality permits. Mining operations would continue as currently permitted on the existing Black Thunder, Jacobs Ranch, and North Antelope Rochelle Mine coal leases. Projected impacts related to NO_X emissions would not be extended onto those portions of the LBA tracts that will not be affected under the mines' current mining and reclamation plans.

As discussed in Section 2.2, a decision to reject one or more of these six coal lease applications at this time would not preclude an application to lease that respective tract in the future.

3.4.3.3 Regulatory Compliance, Mitigation, and Monitoring for NO_X Emissions

Several of the surface coal mines in the PRB have undertaken voluntary blasting restrictions to avoid NO_X emissions impact to the public. Voluntary measures that have been instituted, particularly when large blasts are planned include:

- telephone notification of neighbors (both private parties and other mining operations) in the general area of the mine prior to large blasts;
- monitoring of weather and atmospheric conditions prior to the decision to detonate a large blast;
- minimizing blast size to the extent possible;
- posting of signs on major public roads that enter the general mine area and on all locked gates accessing the active mine area;

- closing public roads that enter the general mine area, depending on wind conditions and blast location with respect to the road; and
- providing post-blast notification to neighbors of potential exposure to the blasting cloud.

To date, there have been no reported events of public exposure to NO_2 from blasting activities at the Jacobs Ranch and North Antelope Rochelle mines. The WDEQ has not required those mines to implement any specific measures to control or limit public exposure to NO_2 from blasting, although the mines have instituted voluntary blasting restrictions to avoid NO_X impact to the public. WDEQ received reports of public exposure to NO_2 from blasting operations at some of the PRB mines prior to 2001, including the Black Thunder Mine. Measures to control or limit future such incidences when large overburden blasts are planned, have been instituted at the Black Thunder Mine. There have been no incidents in the southern PRB reported by the public to the WDEQ for the past 4 years. Measures to avoid impacts to the public are requirements for the Black Thunder Mine as part of a settlement agreement reached in 2000. Many of the other mines have voluntarily implemented similar administrative controls to avoid impacts to the public, as discussed above. Measures that have been implemented include:

- notification of neighbors and workers in the general area of the mine prior to a blast;
- blast detonation between 12:00 p.m. and 3:00 p.m. whenever possible to avoid temperature inversions and minimize inconvenience to neighbors;
- monitoring of weather and atmospheric conditions prior to the decision to detonate a blast;
- posting of signs on major public roads that enter the general mine area and on all locked gates accessing the active mine area; and
- closing public roads when appropriate to protect the public.

The Wyoming EQC has issued orders that address procedures and notification protocols related to providing protections from overburden blasting within PRB mine areas. The conditions state that specific procedures would be used when overburden blasting occurs within a certain distance of residences and businesses adjacent to the mines. Orders have also placed limits on the size of the blasting that can be conducted within the mine areas and restricted blasting under certain atmospheric conditions.

WDEQ has required several PRB surface coal mines, including North Antelope Rochelle, Black Thunder, Belle Ayr, Eagle Butte, and Wyodak (Figure 1-1), to stop traffic on public roads during blasting due to concerns with fly rock and the "startle factor." During blasting operations, public access to some of the roads in the area, including the Antelope Road and State Highway 450, are currently blocked and will continue to be blocked when wind directions or proximity to the road warrant such closure.

Significant research has been conducted at the mines to reduce NO_X emissions from blasting activities. Efforts to eliminate NO_X production have included working with blasting agent manufacturers to reduce NO_X emissions by the use of different blasting agents, different blends of blasting agents, different additives, different initiation systems and sequencing, borehole liners, and smaller cast blasts. Operators have tried adding substances like microspheres and rice hulls, using different blends of ANFO and slurries and gels, using electronic detonation systems that can vary shot timing, different shot hole patterns, and using plastic liners within the shot holes. No one single procedure or variation has proven consistently successful due to the numerous factors that are believed to contribute to the production of NO_2. The most successful control measure has been reducing the size of the cast blasting shots (Emme 2003, Chancellor 2003). The North Antelope Rochelle Mine has had success in eliminating NO_X in over 75 percent of their cast blasting through the use of borehole liners and changing their blasting agent blends (Chancellor 2003).

Mitigation measures implemented to reduce mine-related NO_X emissions should also reduce the potential for the formation of ground-level O_3 in the PRB.

Annual mean NO_2 concentrations have been periodically measured in the PRB since 1975. NO_2 was monitored from 1975 through 1983 in Gillette and from March 1996 through April 1997 at four locations in the PRB, including Gillette. Table 3-10 summarizes the results of that monitoring.

Table 3-10. Annual Ambient NO_2 Concentration Data.

Site	**Gillette, WY**	**Black Thunder Mine**	**Belle Ayr Mine**	**Bill, WY**
Year	**Percent of Standard[1]**	**Percent of Standard[1]**	**Percent of Standard[1]**	**Percent of Standard[1]**
1975	6*			
1976	4*			1*
1977	4*			5*
1978	11*			
1979	11			
1980	12			
1981	14			
1982	11			
1983[2]	17			
1996-97[3]	16	16	22	22

[1] Based on arithmetic averaging of data.
[2] Monitoring discontinued December 1983, reactivated March 1996 to April 1997.
[3] Arithmetic average – actual sampling ran from March 1996 to April 1997.
* Inadequate number of samples for a valid annual average.
Source: (McVehil-Monnett 1997)

Due to public concerns about emissions of nitrogen dioxides as a result of blasting and a general concern of the WDEQ about levels of nitrogen dioxides due to development of all types in the eastern PRB, the coal mining industry instituted a monitoring network in cooperation with WDEQ/AQD to gather data on NO_2 beginning in 2001. Through a cooperative agreement between AQD and the Wyoming Mining Association, the PRB NO_X network began operation in January 2001 (WDEQ/AQD 2008). Industry funded and operated the network for approximately 3 years. Ownership of some of the monitoring equipment was transferred to WDEQ by the mines and WDEQ now funds and operates that NO_2 monitoring equipment. The mines have been given ongoing access to all of the monitoring sites and provide electrical power for the instrumentation. WDEQ/AQD and the mines now share maintenance of these monitoring stations, and the AQD is relying on the ongoing monitoring data and emission inventories in the mines' air quality permit applications to demonstrate compliance with the annual NO_2 ambient air standard (Table 3-8). The 2002 through 2007 data from this regional network are summarized in Table 3-11. With respect to the general Wright analysis area, the Tracy Ranch Site is located roughly in the geographic center of the area (TBCC owns and operates that site), the Thunder Basin National Grassland Site is approximately 67 miles north, and the Campbell County Site is approximately 33 miles northwest. As noted in Tables 3-9 and 3-10, the mean annual NO_2 concentrations for all monitoring sites have historically been significantly below the WAAQS and NAAQS annual standard (100 $\mu g/m^3$).

Table 3-11. 2002 Through 2008 Annual Mean NO_2 Concentration Data ($\mu g/m^3$).

Site Address	2002	2003	2004	2005	2006	2007	2008
TBNG[1]	5.7	5.7	3.8	3.8	3.8	3.8	3.8
Belle Ayr Mine[1]	--	13.2	13.2	15.1	17.0	--	--
Antelope Mine[1]	--	7.5	7.5	9.4	7.5	--	--
Campbell County[1]	--	13.2	9.4	7.5	5.7	7.5	5.6
Tracy Ranch[2]	6.2	5.6	5.8	7.7	11.8	8.2	6.1
Average	5.95	9.04	7.94	8.70	9.16	6.50	5.17

[1] Monitor values from EPA (2009a)
[2] Monitor values from TBCC (2009)

The WDEQ/AQD's Ambient Air Monitoring Annual Network Plan provides an overview of the number and types of air quality monitors AQD runs or oversees within the state of Wyoming, and is available for review on its website at: http://deq.state.wy.us/aqd/downloads/AirMonitor/Network%20Plan_2008.pdf

3.4.4 Air Quality Related Values (AQRVs)

AQRVs are evaluated by the land management agency responsible for a Class I area, according to the agency's level of acceptable change (LAC). These AQRVs include potential air pollutant effects on visibility and the acidification of lakes

Exhibit 7

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

Department of **Employment, Economic Development and Innovation**

Coal mine workers

FACT SHEET

Avoiding exposure to oxides of nitrogen (NOx) fumes from surface blasts

What are blast fumes?

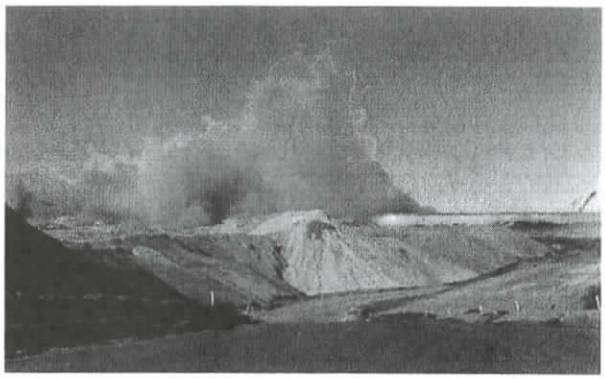
Blast fumes are the gases that may be generated during blasting.

Some of these gases can affect health, including oxides of nitrogen [nitric oxide (NO) and nitrogen dioxide (NO_2)]. NO_2 is the more toxic of the two.

What do blast fumes look like?

They are typically a reddish/orange cloud — NO_2 is what gives the cloud this colour and the colour becomes deeper with higher concentrations of NO_2.

Blast fumes also have a pungent odour and taste.



Blast fume generated after a shot.

What do I do if am exposed to a blast fume?

Immediately report exposure to your supervisor and follow the site medical plan. If you have been examined and released by a medical practitioner but later develop symptoms, you must seek urgent medical attention.

Tolerable exposure

There is a level of tolerable exposure that people can deal with. The short-term exposure limit (STEL) for NO_2 is 5 parts-per-million (ppm). STEL exposures should not be longer than 15 minutes and should not be repeated more than four times a day with at least 60 minutes between successive exposures.

Mine sites should work towards preventing fume generation, but where this is not possible, fume exposures must be kept below the STEL.

If I can smell NO_2 does it mean I have been over exposed?

No. NO_2 has a very strong acrid odour that can be smelled at much lower levels than the tolerable limits. At these low levels, the effects are extremely unlikely to be harmful to health, particularly if the reddish/brown gas is not visible.

NO_2 above 2.5 ppm is visible. Higher concentrations above 4 ppm may deaden the sense of smell.

Symptoms from high exposure

- eye irritation and coughing
- initial dizziness and/or headache (may subside)
- shortness of breath
- 5–8 hours later, cyanosis (blue lips, fingertips)

What can I do to prevent being exposed?

- Comply with blast-exclusion zones and fume-management zones.
- Inform blast controller of fume clouds and their location and movement.
- Do not enter or remain in fume clouds.
- Move out of fume cloud path.
- Wear gas monitors if directed.

NOx can be measured using portable gas detectors. Ensure monitors are calibrated and set correctly before use.

Nitrogen dioxide (NO_2) concentrations for odour, visibility and 'immediate danger to life and health' (IDLH)

Odour threshold	0.12 ppm
Visible	2.5 ppm
Any atmosphere in which nitrogen dioxide (NO2) is noticeable by smell, irritation and colour should be regarded as potentially dangerous.	3 ppm – 5 ppm
Specific symptoms may materialise above this level and can result in immediate danger to life and health (IDLH). IDLH is defined as exposure to airborne contaminants that are likely to cause death or immediate or delayed adverse health effects, or prevent escape from such an environment.	20 ppm+

Further information

Further information relating to blast-fume prevention, management and health effects can be found in the Queensland Guidance Note 20 'Management of oxides of nitrogen in open-cut blasting', available at **www.deedi.qld.gov.au**

CF11 D0641

Queensland Government

Exhibit 8

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

Gillette News Record

Nitric oxide cloud hangs over air in south Gillette

POSTED: MONDAY, JANUARY 23, 2012 12:00 AM
LAURA HANCOCK, NEWS RECORD WRITER 0 COMMENTS

An orange-brown cloud that hung in the sky above Gillette on Monday afternoon was caused by blasting at Caballo coal mine south of Gillette.

The cloud formed after blasting at 2:20 p.m., said Charlene Murdock, a spokeswoman for mine owner St. Louis-based Peabody Energy Corp.

"Emissions that occasionally arise from blasting normally rise and dissipate, yet in (Monday's) instance, the emissions lingered east of Gillette before dissipating," she said. "This is an isolated and rare incident for Peabody Energy and we are working closely with the Wyoming Department of Environmental Quality to investigate its nature and cause."

The cloud prompted a warning to residents of the Nickelson's Little Farms and Sleepy Hollow neighborhoods to stay inside. Additionally, residents in Campbell County with sensitive respiratory systems or ailments such as asthma or COPD were told to stay inside and close their doors and windows.

"It's not poisonous," said David King, Campbell County emergency management coordinator. "It's not toxic, but it could have long-term health effects with repeated exposure. I'm not trying to downplay it but I don't want to give people a heart attack."

The cloud, which contained nitric oxide, was formed after Caballo mine blasted either dirt or coal, King said.

"It forms normally from incomplete combustion of ammonia nitrate used in blasting," King said.

Mines blast layers of dirt over the coal seam, called "overburden," to make it easier to get to the coal.

In the seam, mines will fracture coal through blasting.

The overburden blasts take longer to set up, which can expose the blasting chemicals to moisture and dirt. Most of the nitric oxide clouds are from overburden blasts, but it's unclear whether Monday's blast was an overburden blast.

The calls to the public began at 3 p.m.

The cloud moved north but by sunset it had either dissipated or could no longer be seen, King said.

Such clouds, which occasionally appear above Campbell County due to mining, typically sit low. Monday's lack of wind kept the cloud in tact for more than an hour.

"Ultimately, it's one of those chemical combinations that is heavier than air," King said.

The Wyoming DEQ is looking into the incident, agency spokesman Keith Guille said.

"We do our own investigations any time this happens," he said.

Exhibit 9

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

Gillette News Record

Cast blast creates a cloud

Reddish-brown cloud was not unusual for residents near Rawhide coal mine

Alexandra Sokhrannova Duckar, News Record writer
Posted 1/4/13

The orange cloud that Joe Green saw out of his window Thursday morning was nothing unusual.

"I see them quite often. It's pretty typical," he said. "It's a couple times a month probably."

The cloud was a result of cast blasting at 10:26 a.m. Thursday at Rawhide mine owned by Peabody Energy.

Cast blasting is a blasting technique used for removal of overburden (the top soil that covers the coal seam). The technique blasts the top soil more energetically to move it across and into the pit void created by the coal being removed.

The reddish-brown color is common to cast shots but it can sometimes be seen from conventional shots, according to information from Land Quality Division at the Wyoming Department of Environmental Quality.

David King, Campbell County emergency services coordinator, said he was received a report from an amateur radio enthusiast following the blast.

About 95 percent of the cast shots in the Powder River Basin produce visible nitrogen oxides fumes. All mines that cast blast use operational controls to check for wind speed, direction and temperature inversions and they don't shoot when the wind or inversions could cause the fumes to drift near houses or other inhabited buildings near the mine, said Keith Guille, spokesman for the DEQ.

The color is from oxides of nitrogen in the fume cloud, specifically NO_2, nitric dioxide, which is a toxic gas and should be avoided. Other factors including explosives getting wet and breaking down, underfueling the blasting agent, weak geology, desensitized blasting agent due to borehole pressure or detonation pressure of adjacent holes, also contribute to formation of nitrogen oxides, Guille said.

Because the nitrogen oxide fumes are toxic, the mines use the operational controls to assure that the fumes don't come in contact with people off the mine site, according to the DEQ. There are also signs on public roads all around the Powder River Basin that warn people to stay away from the reddish blasting fumes.

Almost 1.4 million pounds of explosive were used in the shot Thursday. The shot had been postponed for three days due to unfavorable wind direction, Guille said. The wind was at 13 mph out of the southwest, which would have pushed any dust and fumes from the shot away from any houses or mine buildings in the area, he added.

In Thursday's case, the mine crew followed the fume cloud off site for over an hour to make sure it didn't impact anyone downwind, Guille said.

Exhibit 10

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

Emissions - Unit Level Data Report
Mar 22, 2014

Your query will return 1 Facility(s) and 1 Unit(s)

Program: Acid Rain Program (ARP)

Data Set: Emissions - Unit Level Data

Time Frame: Emissions :
Annual : 2013

Criteria: Facility Name/ID : Wyodak

Aggregate Criteria: No Aggregation (Unit Level)

Columns: State, Facility Name, Facility ID (ORISPL), Unit ID, Associated Stacks, Year, Program(s)

Record Number	State	Facility Name	Facility ID (ORISPL)	Unit ID	Associated Stacks	Year	Program(s)
1	WY	Wyodak	6101	BW91		2013	ARP

Columns: SO2 (tons), Avg. NOx Rate (lb/MMBtu), NOx (tons), CO2 (tons), Heat Input (MMBtu)

Record Number	SO2 (tons)	Avg. NOx Rate (lb/MMBtu)	NOx (tons)	CO2 (tons)	Heat Input (MMBtu)
1	2,235.7	0.19	3,005.9	3,273,964.7	31,216,245

Exhibit 11

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

Permit Application Analysis
AP-10986

December 15, 2010

NAME OF FIRM:	Thunder Basin Coal Company, LLC
NAME OF FACILITY:	Black Thunder Mine
FACILITY LOCATION:	Twelve (12) miles southeast of Wright Campbell County, Wyoming
TYPE OF OPERATION:	Surface Coal Mine
RESPONSIBLE OFFICIAL:	Mr. Kenneth Cochran President and General Manager
MAILING ADDRESS:	P.O. Box 406 Wright, WY 82732
TELEPHONE NUMBER:	(307) 464-2113
REVIEWERS:	Andrew Keyfauver, NSR Permit Engineer James (Josh) Nall, Air Quality Meteorologist

1.0 PURPOSE OF APPLICATION:

Thunder Basin Coal Company submitted an application to modify operations at the Black Thunder Mine. This application proposes to combine the Black Thunder Mine and Jacobs Ranch Mine into one entity (Black Thunder Mine) with a maximum annual coal production rate of 190 million tons per year (MMtpy), and to modify the coal progression sequence.

2.0 PERMIT HISTORY

2.1 Black Thunder

Thunder Basin Coal Company was issued modification permit MD-6824 on January 22, 2008. This permit established federally enforceable permit conditions to establish the Black Thunder Mine as a synthetic minor source under Chapter 6, Section 3 of the Wyoming Air Quality Standards and Regulations (WAQSR).

Thunder Basin Coal Company was issued modification permit MD-3851 on August 18, 2008. This permit combined the Black Thunder Mine and North Rochelle Mine into one entity (Black Thunder Mine) with a maximum coal production rate of 135 MMtpy, and to modify the coal progression sequence. This permit superseded all previous Chapter 6, Section 2 permits and waivers for the Black Thunder and North Rochelle Mines except for MD-6824.

Thunder Basin Coal Company was issued amended air quality permit MD-3851A on January 27, 2009. This amendment removed the South Black Thunder facilities as Thunder Basin Coal Company no longer had control or ownership of the facilities.

Thunder Basin Coal Company was issued permit waiver wv-9702 on August 6, 2009. This permit waiver authorized the hauling of 15 MMtpy of coal from the Jacobs Ranch Pit 1 to the Black Thunder (BT) 6 North Crusher over a period of three (3) years.

2.2 Jacobs Ranch

Jacobs Ranch Coal Company was issued amended air quality permit MD-1005A2 on January 22, 2007. This permit revised the Lands Necessary to Conduct Mining (LNCM) boundary due to the necessity to provide catch benches and highwall angles for mining safety. There was no production or emission increases associated with the LNCM boundary change. This permit superseded all previously issued Chapter 6, Section 2 permits and waivers for the Jacobs Ranch Mine.

Thunder Basin Coal Company was issued permit waiver wv-9901 on September 24, 2009. This permit waiver revised the mine progression for the Jacobs Ranch Mine and allowed the flexibility to haul up to 10 million tons of coal annually from the Black Thunder Mine to the truck dumps at the Jacobs Ranch Mine.

3.0 PROCESS DESCRIPTION

3.1 Mine Plan

The exiting Black Thunder and Jacobs Ranch Mines are existing surface mines that produce sub-bituminous coal and are located approximately twelve (12) miles southeast of Wright, Wyoming. Overburden is removed by cast blasting, dozer pushes and dragline along with the conventional truck and shovel method. Mined coal is hauled to truck dumps where the coal is crushed and transferred via covered conveyors to storage silos and load-out facilities.

3.2 Coal Preparation Facilities

The existing coal preparation facilities at the Black Thunder Mine are designated as the Primary, Near-Pit, 5-West Near-Pit Crushing and Conveying (NPCC) system, and 6-North NPCC system. The Primary truck dump/crusher is located near the storage and loadout facilities for coal mined in pits closer to the facilities. The Near-Pit consists of two side-by-side truck dumps with crushers that feed the overland conveyor which transports coal to the main storage and loadout facilities. The 5-West NPCC system consist of one truck dump, crusher, and conveyor and is located southwest of the Black Thunder rail loop at the mine. The Primary, Near-Pit, and 5-West NPCC deliver coal to the main rail loop load-out system. The 6-North NPCC system consists of one truck dump hopper with a stilling shed, a 7,000 ton per hour two-stage crusher, and an 11,000 foot long, 72 inch wide overland conveyor, which feeds is own load-out system known as the West Black Thunder Load-out. Truck dumps at the existing Black Thunder Mine are controlled with stilling sheds, and conveyor transfer points are controlled with atomizer/fogger systems.

The existing facilities at the Jacobs Ranch Mine are designated as Circuit 3 and Circuit 4. Circuit 3 is a parallel truck dump-crusher-conveyor system which feed the East Black Thunder Load-out. Circuit 4 consists of a dual truck dump, crusher, and overland conveyor system which feed the East Black Thunder Load out. The Circuit 3 and 4 truck dumps are controlled with stilling sheds and conveyor transfer points are controlled with atomizer/fogger systems.

Figures 3-1 and 3-2 provide schematics of the existing coal processing and conveying equipment at the existing Black Thunder and Jacob Ranch Mines.

Figure 3-1 – Existing Black Thunder Coal Preparation Facilities

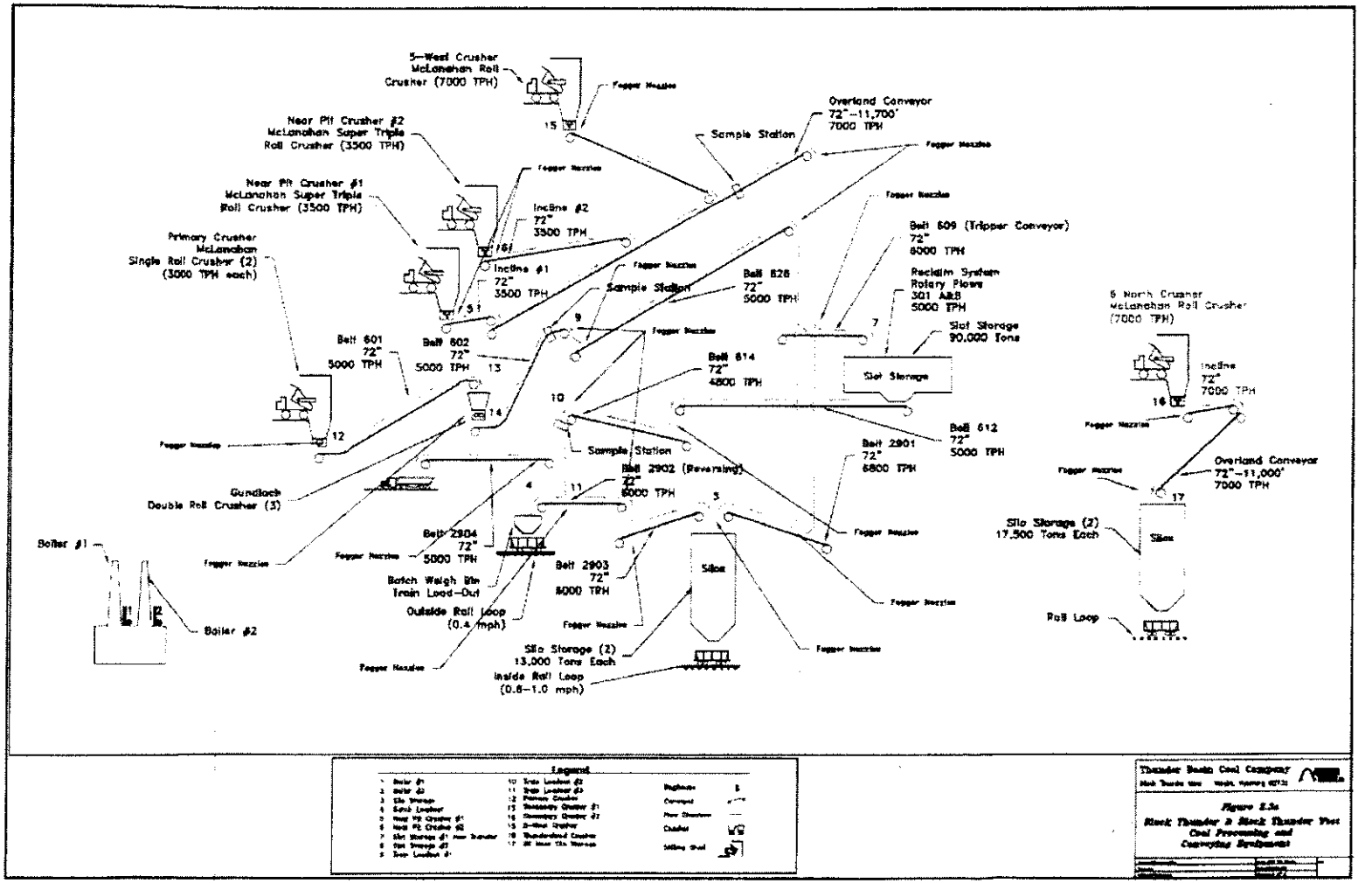
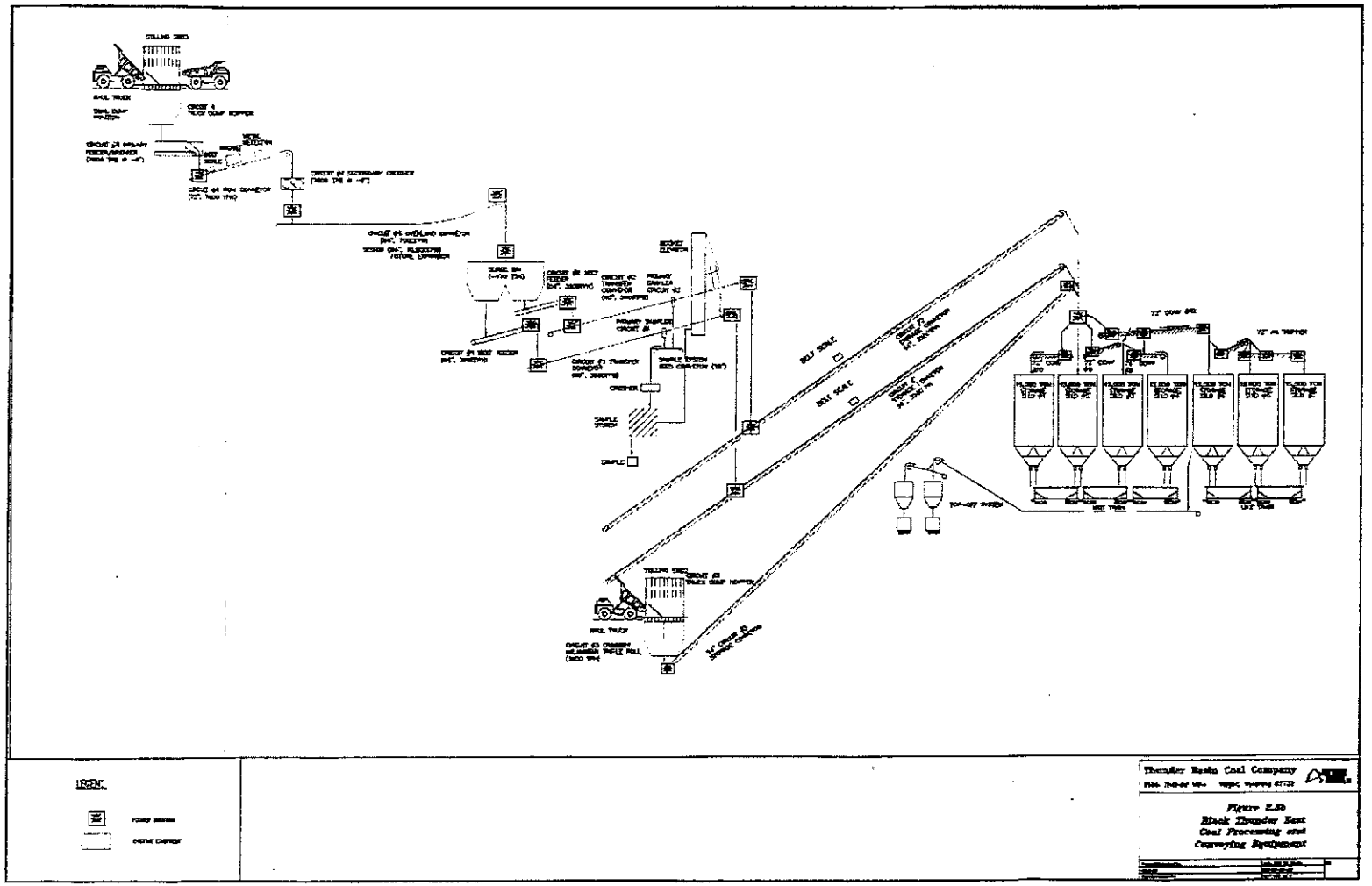


Figure 3-2 – Existing Jacobs Ranch (East Black Thunder) Coal Preparation Facilities



3.3 Mining Equipment

Equipment utilized at the mine changes from year to year depending on several operational factors. In general, as older, smaller equipment is retired, it is replaced with new, larger equipment. Table 3-1 provides a listing of major mining equipment currently in use at the mine, and the equipment required to produce at a mining rate of 190 MMtpy.

Table 3-1
Black Thunder Mine
Mining Equipment

Equipment	Type/Size	Operating Units in 2010	Operating Units to produce 190 MMtpy
Draglines	44-164 Yd^3	6	7
Shovels	36-85 Yd^3	22	28
Front-End Loaders	4-54 Yd^3	10	13
Dozers D11 or equivalent	--	30	41
Dozers D10 or equivalent	--	7	9
Dozer (Rubber Tired) CAT 854 or equivalent	--	8	10
Motorgraders 24H	24 ft blade	15	20
Motorgraders 16G	16 ft blade	6	8
Water Trucks	12,000-16,000 gallon	16	21
Track Hoes	0.8-18 Yd^3	9	12
Scrapers	30-44 Yd^3	7	9
Drills	10-12.25" hole diameter	14	16
Haul Trucks	240-400 ton	150	202

3.4 Disturbed Acreage

The Division considers acreage within the mine boundary that is subject to wind erosion as disturbed acreage. The Division requested that the applicant include a discussion regarding open acreage at the mine. A detailed description of the land status with respect to open or disturbed acreage was provided by the applicant. Some of the information was taken from the Land Quality Division (LQD) for the 2009 reporting year. Table 3-2 shows the disturbed acreage for the Black Thunder Mine.

Figure 4-1 – Black Thunder Mine Pit Progression

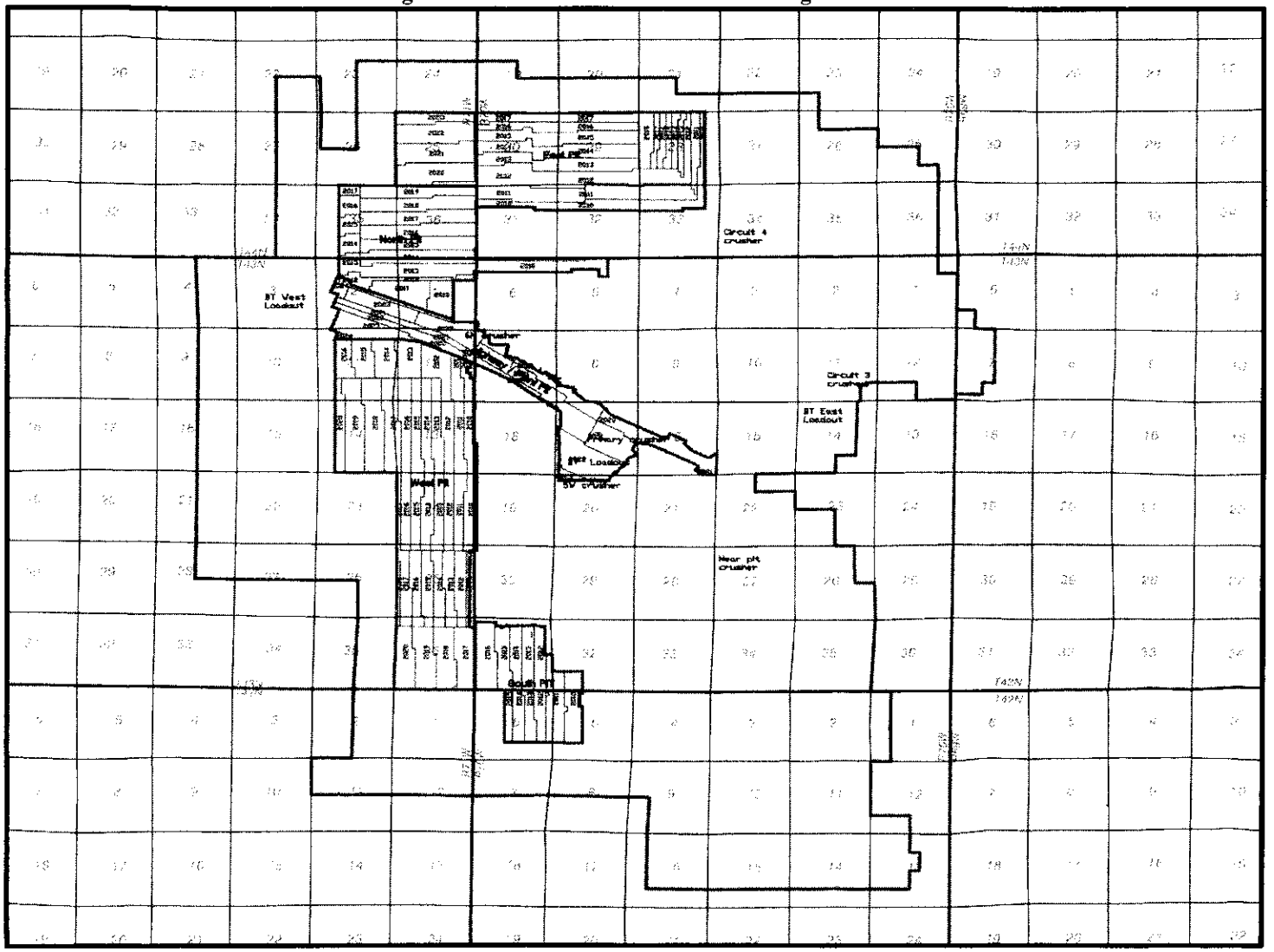


Table 3-2 Black Thunder Mine Disturbed Acreage	
	2009 Acres
Total Disturbed Acres	27,955
Total Reclaimed	11,663
Potential Open Acres	16,291
Newly Reclaimed Acres	218
Stabilized acres: pit	2,843
Stabilized stockpiles	2,140
Stabilized acres: other (long term facilities)	1,345
Total actual open acres [1]	**10,181**

[1] Total actual open acres based on potential open acres minus the sum of newly reclaimed acres, stabilized acres: pit, stabilized stockpiles, and stabilized acres: other.

The amount of open acreage utilized for the modeling was the current year quantity. This quantity was then adjusted to reflect the volume of tons produced and ratio of overburden to coal. The applicant assumed that the current conditions in some aspects of mining were a reasonable representation for the model years. The basis for this assumption is that mine facilities are not expected to change significantly over the life of the mine and a program of contemporaneous reclamation is maintained which includes temporary reclamation practices that reduce areas subject to wind erosion. Haul road corridors will remain roughly the same through the life-of-mine (LOM).

4.0 PROPOSED MINE MODIFICATIONS

Thunder Basin Coal Company is proposing to modify the Black Thunder Mine Plan by changing the coal production rate and coal removal progression. With the merging of the Black Thunder and Jacobs Ranch Mines, the maximum permitted coal production rate will be 190 MMtpy with mining scheduled for completion in year 2024. This change will not affect the LNCM boundary for the Black Thunder Mine other than the incorporation of the Jacobs Ranch boundary. Figure 4-1 shows the proposed pit progression along with the Black Thunder Mine LNCM Boundary. This figure is contained in the application as Figure 2.1 Black Thunder Mine Coal Mining Sequence.

5.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

5.1 Coal Dumping, Crushing, Processing & Preparation Facility Controls

5.1.1 Truck Dumps

With the finalization of the revisions to Subpart Y of 40 CFR part 60, the Division is proposing to revise how the relative control effectiveness of existing truck dump control systems is determined for truck dumps constructed, reconstructed, or modified before April 28, 2008. Previously, the Division considered the threshold defining relative control effectiveness to be twenty percent (20%) opacity as determined by taking the maximum instantaneous opacity of fugitive emissions observed from each truck dump activity, averaged for ten trucks. In the revisions to Subpart Y, the EPA has finalized a reference method for determining the opacity from truck dumps constructed, reconstructed, or modified after April 28, 2008, which is described in 40 CFR §60.255(h)(1)(i) and (ii). The Division is proposing that a demonstration of relative control effectiveness be conducted on a quarterly basis for existing truck dumps following the methodology specified in Subpart Y. The Division is also proposing to retain the twenty percent (20%) opacity threshold to define relative control effectiveness for existing truck dumps. If a control effectiveness demonstration is twenty percent (20%) opacity or greater than Thunder Basin Coal Company is to conduct an immediate inspection of the control system, and conduct corrective action, if necessary.

Weekly inspections of the stilling sheds shall be conducted by Thunder Basin Coal Company to determine any repair measures necessary to minimize fugitive dust emissions and maintain proper operation of the control systems. Corrective action and repair measures must be initiated in an expeditious manner when the control device is determined to be improperly maintained or operated.

Truck dump pads in front of stilling shed and hoppers have been identified as sources of fugitive dust as pulverized material that accumulates on pads due to spillage is easily disturbed by truck traffic. Cleaning practices at the Black Thunder Mine shall be adequate to control fugitive dust emissions in these areas.

5.1.2 Atomizer/Fogger Systems

Thunder Basin Coal Company currently utilizes atomizer/fogger systems at transfer points associated with the coal preparation facilities. The Division considers atomizer/fogger systems to be as efficient as traditional baghouse control devices which have been considered to represent BACT for these types of applications, and is satisfied that atomizer/fogger systems can operate as effective control devices on a continuous basis.

The atomizer/fogger systems are to be operated and maintained so that the system enclosures exhibit no visible emissions. As a condition of the permit, the Division will establish a no visible emissions limit on the atomizer/fogger systems as determined by Method 22 of appendix A, 40 CFR part 60. Thunder Basin Coal Company is to conduct daily inspections of each of the atomizer/fogger systems to determine the presence of visible emissions. Results of the daily observations are to be recorded, and if any emissions are noted, immediate corrective action is to be taken. Thunder Basin Coal Company may also utilize 40 CFR §60.255(f) of Subpart Y to demonstrate continuous compliance for the atomizer/fogger systems not subject to Subpart Y.

5.1.3 Baghouses

Baghouses are utilized at the existing coal preparation facilities to control fugitive dust emissions. Thunder Basin Coal Company will be required to conduct daily inspections of the baghouses in operation to determine the presence of visible emissions. Results of the daily observations are to be recorded, and if any emissions are noted, immediate corrective action is to be taken. The visual observations at each baghouse shall be conducted by personnel who are educated on the general procedures for determining the presence of visible emissions, but not necessarily certified to conduct Method 9 observations. Thunder Basin Coal Company may utilize 40 CFR §60.255(f) of Subpart Y to demonstrate continuous compliance for the baghouses. Baghouses at the mine are shown in Table 5-1 along with their respective particulate (PM_{10}) emission rates.

Table 5-1
Black Thunder Mine
Baghouse Particulate Emissions (PM_{10})

Source ID	Description	lb/hr	tpy
Boiler 1	Boiler #1 Baghouse	1.9	8.2
Boiler 2	Boiler #2 Baghouse	3.6	15.7
Top 1	Coal Top-off Baghouse 1	0.35	1.5
Top 2	Coal Top-off Baghouse 1	0.35	1.5
Top 3	Coal Top-off Baghouse 2	0.35	1.5
Top 4	Coal Top-off Baghouse 4	0.35	1.5

The baghouses at the Black Thunder Mine are subject to Subpart Y of 40 CFR part 60. Subpart Y limits opacity from these baghouses to less than twenty percent (20%) as determined by Method 9 of appendix A, 40 CFR part 60, as the emission units were constructed, reconstructed or modified before April 28, 2008.

5.2 Haul Road Dust Control Program

Thunder Basin Coal Company operates a dust control program that involves the use of large volumes of water and dust suppressants on roads. Use of water and chemical application varies depending upon specific circumstances such as the location and duration of mining activities, the amount of precipitation, and the residual chemicals remaining from prior treatments. Contractors utilized by the mine for topsoil salvage and replacement activities provide water trucks for dust control in their work areas. In general, depending upon weather conditions, less water is applied in the winter and early spring. Summer and fall are the peak demand seasons for water application.

Historical use of water and dust suppressant is summarized in Table 5-2, which also shows the number of water trucks and total water truck operating hours at the Black Thunder Mine.

Table 5-2
Black Thunder Mine
Historical Water and Chemical Dust Suppressant Usage [1]

Year	Production Coal (MMtpy)	Production OB (MMbcy)	Number & Hours of Water Truck	Water Usage (gal)	PennzSuppress Usage (gal)	$MgCl_2$ Usage (gal)
2008	88.50	303.18	11 – 21,028	472,499,197	78,650	203,335
2009	72.38	277.97	18 – 24,395	576,469,600	10,526	0

[1] Based on dust control reports submitted to AQD each year.

5.3 Disturbed Acreage

The Division considers acreage within the mine boundary that is subject to wind erosion as disturbed acreage. Contemporaneous reclamation helps minimize wind erosion from mined areas. Vegetation of soil is done in a timely manner to help minimize wind erosion emissions. Permanent reclamation is done as soon as possible after mining is completed, and seeding occurs during the first favorable planting conditions. Temporary revegetation is not only used to prepare reclaimed areas for permanent reclamation, but is the main method for minimizing emissions from wind erosion. Temporary revegetation is also utilized to minimize windblown dust from areas that may be inactive for long periods of time. Windrows are bladed in pit advance areas where topsoil has been stripped. Topsoil stockpiles and sediment control structures are seeded during the first normal period favorable for planting. Surface preparation techniques, some of which include mulching, surface pitting or contour ripping, are used to control wind erosion and vegetation growth.

5.4 Coal Fires

Thunder Basin Coal Company operates a program to mitigate natural or accidental coal fires at the Black Thunder Mine. All employees are responsible for reporting coal fires when they are discovered. Operations personnel will determine the best way to handle a particular fire. Common practices used in extinguishing coal fires include digging them out and burying them in backfill, smothering them with overburden, or using water. Reported fires are to be extinguished within 24 hours unless operational safety issues prevent accessing the area. For significant fires, operation personnel will document the measures utilized to extinguish the fire as well as the timeframe it took to extinguish the fire.

5.5 Other BACT Practices Addressed at the Black Thunder Mine Include:

- The access road to the mine has been paved, and parking areas have been paved wherever practical.
- Emissions from coal conveying at the coal preparation plant are reduced through the use of covered conveyors and coal storage silos.
- Thunder Basin Coal Company has committed to the use of water on temporary haul roads.
- Overburden loading and coal loading emissions are controlled by limiting the drop height between the bucket and truck bed.

- At the coal loadouts, emissions are controlled through the use of telescoping chutes which limit the drop height of coal into the train cars.

6.0 ALLOWABLE POINT SOURCE EMISSIONS

There are currently six (6) particulate point sources at the Black Thunder Mine (including the baghouses at the Jacobs Ranch Mine prep-plant). Emission limits associated with these point sources are shown in the Table 6-1.

Table 6-1
Black Thunder Mine
Particulate Point Source Emissions

Emission Unit Description	PM_{10}	
	lb/hr	tpy
Black Thunder		
Primary Crusher	Controlled with Atomizer/fogger system	
Secondary Crusher	Controlled with Atomizer/fogger system	
Belt 2902 Transfer	Controlled with Atomizer/fogger system	
Belt 2903 Transfer	Controlled with Atomizer/fogger system	
North Silo Headhouse	Controlled with Atomizer/fogger system	
Belt 2901 Transfer	Controlled with Atomizer/fogger system	
Belt 612 Transfer	Controlled with Atomizer/fogger system	
Belt 626 Transfer	Controlled with Atomizer/fogger system	
Belt 609 Transfer	Controlled with Atomizer/fogger system	
Near Pit Crusher #1	Controlled with Atomizer/fogger system	
Near Pit Crusher #2	Controlled with Atomizer/fogger system	
Near Pit Overland Conveyor Transfer	Controlled with Atomizer/fogger system	
5-West Crusher	Controlled with Atomizer/fogger system	
Boiler #1 Baghouse	1.9	8.2
Boiler #1 Baghouse	3.6	15.7
Black Thunder West		
West Crusher	Controlled with Atomizer/fogger system	
West Overland Conveyor Transfer	Controlled with Atomizer/fogger system	
Black Thunder East		
East Circuit #4 ROM Conveyor	Controlled with Atomizer/fogger system	
East Circuit #4 Overland Conveyor	Controlled with Atomizer/fogger system	
East Circuit #4 Surge Bin	Controlled with Atomizer/fogger system	
East Circuit #1 South Transfer	Controlled with Atomizer/fogger system	
East Circuit #2 North Transfer	Controlled with Atomizer/fogger system	
East Circuit #2 Storage Conveyor	Controlled with Atomizer/fogger system	
East Circuit #1 Storage Conveyor	Controlled with Atomizer/fogger system	
East Circuit #3 Storage Conveyor	Controlled with Atomizer/fogger system	
East #5 Belt	Controlled with Atomizer/fogger system	
East #6 Belt	Controlled with Atomizer/fogger system	
East #8 Belt	Controlled with Atomizer/fogger system	
East #A4 Belt	Controlled with Atomizer/fogger system	

Table 6-1 Black Thunder Mine Particulate Point Source Emissions		
Emission Unit Description	PM_{10}	
	lb/hr	tpy
East #9 Belt	Controlled with Atomizer/fogger system	
East #A2 Belt	Controlled with Atomizer/fogger system	
Coal Top-off Baghouse 1	0.35	1.53
Coal Top-off Baghouse 1	0.35	1.53
Coal Top-off Baghouse 2	0.35	1.53
Coal Top-off Baghouse 4	0.35	1.53
Total	**6.9**	**30.0**

7.0 CHAPTER 6, SECTION 3 – MAJOR SOURCE APPLICABILITY

The Division determines major source applicability based on point sources and includes fugitive emissions from sources which are subject to new source performance standards which were in effect as of August 7, 1980. The truck dumps at the mine are subject to a new source performance standard (Subpart Y); therefore, emissions from the truck dumps are counted toward major source applicability, and are estimated at 54.5 tpy based on a maximum annual production rate of 190 MMtpy of coal. NO_x, CO, and SO_2 are emitted from stationary boilers and stationary diesel fired equipment at the mine. This equipment is addressed under permit application AP-10900, which will establish federally enforceable conditions to ensure the facility is a minor source under Chapter 6, Section 3 of the Wyoming Air Quality Standards and Regulations (WAQSR).

Table 7-1 Black Thunder Mine Major Source Applicability				
	PM_{10}	NO_x	SO_2	CO
Point Source Emissions [1]	30.0	64.5	41.6	98.6
Fugitive Truck Dump Emissions	54.5	--	--	--
Totals	**84.5**	**64.5**	**41.6**	**98.6**

[1] NO_x, SO_2, and CO emissions are taken from AP-10900.

Table 7-1 reflects PM_{10} emissions based on truck dumps controlled with a stilling shed with a control efficiency of 85%. Since emissions are less than 100 tons per year, the Black Thunder Mine is not a "major source" as defined in Chapter 6, Section 3 of the WAQSR.

8.0 NEW SOURCE PERFORMANCE STANDARDS (NSPS)

The coal preparation facilities at the Black Thunder Mine are subject to 40 CFR part 60, subpart Y. Subpart Y limits the opacity from sources which have been constructed, reconstructed, or modified before April 28, 2008 to less than 20 percent as determined by Method 9 of 40 CFR part 60, appendix A. Sources which have been constructed, reconstructed, or modified after April 28, 2008 are subject to an opacity limit of less than 10 percent as determined by Method 9 of 40 CFR part 60, appendix A. The coal preparation facilities at the Black Thunder Mine are subject to an opacity standard of less than 20 percent as the coal preparation facilities are not being modified.

9.0 CHAPTER 6, SECTION 4 – PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

A major stationary source under Chapter 6, Section 4 of the Wyoming Air Quality Standards & Regulations (WAQSR) is a named facility which emits, or has the potential to emit, one hundred (100) tons per year or more of any air pollutant or any stationary source which emits or has the potential to emit two hundred and fifty tons per year or more of any pollutant for which standards are established. The Black Thunder Mine is not a named source under Chapter 6, Section 4; therefore, the 250 tpy threshold is applicable to this facility. The proposed permitting action is not subject to Prevention of Significant Deterioration (PSD) review under Chapter 6, Section 4 of the WAQSR as applicable emissions are not 250 tpy or greater. Applicable emissions are emissions from point sources and fugitive emissions from named sources or from sources which were subject to an NSPS as of August 7, 1980.

10.0 PROJECTED IMPACT ON EXISTING AMBIENT AIR QUALITY

10.1 OVERVIEW OF MODELING ANALYSIS

10.1.1 Project Overview

The application proposes to combine the Black Thunder Mine and Jacobs Ranch Mine into one entity (Black Thunder Mine) with a maximum annual coal production rate of 190 million tons per year (MMtpy), and to modify the coal progression sequence. Because of these changes, the Division required the applicant to conduct an ambient air quality analyses to predict impacts from emissions of particulate matter less than 10 microns in diameter (PM_{10}) and nitrogen oxides (NO_x).

10.1.2 Model Selection

The applicant used the Environmental Protection Agency (EPA) Industrial Source Complex Long-Term Model (ISCLT3, version 96113) to evaluate concentrations of PM_{10} and nitrogen dioxide (NO_2) to compare to the Wyoming Ambient Air Quality Standards (WAAQS). The ISCLT3 dispersion model is a steady-state, Gaussian dispersion model designed to predict ground-level pollutant concentrations from a variety of sources associated with industrial complexes such as surface coal mines.

Current Division policy does not endorse modeling to predict short-term (24-hour) ambient impacts from fugitive dust particulate sources. Modeling is not believed to be viable for the prediction of 24-hour impacts because of the high degree of uncertainty in short-term emissions estimates for fugitive sources and the uncertainty in the treatment of fugitive sources in the EPA models themselves. Therefore, the PM_{10} modeling analysis was conducted to determine only long-term (annual) average PM_{10} ambient concentration estimates.

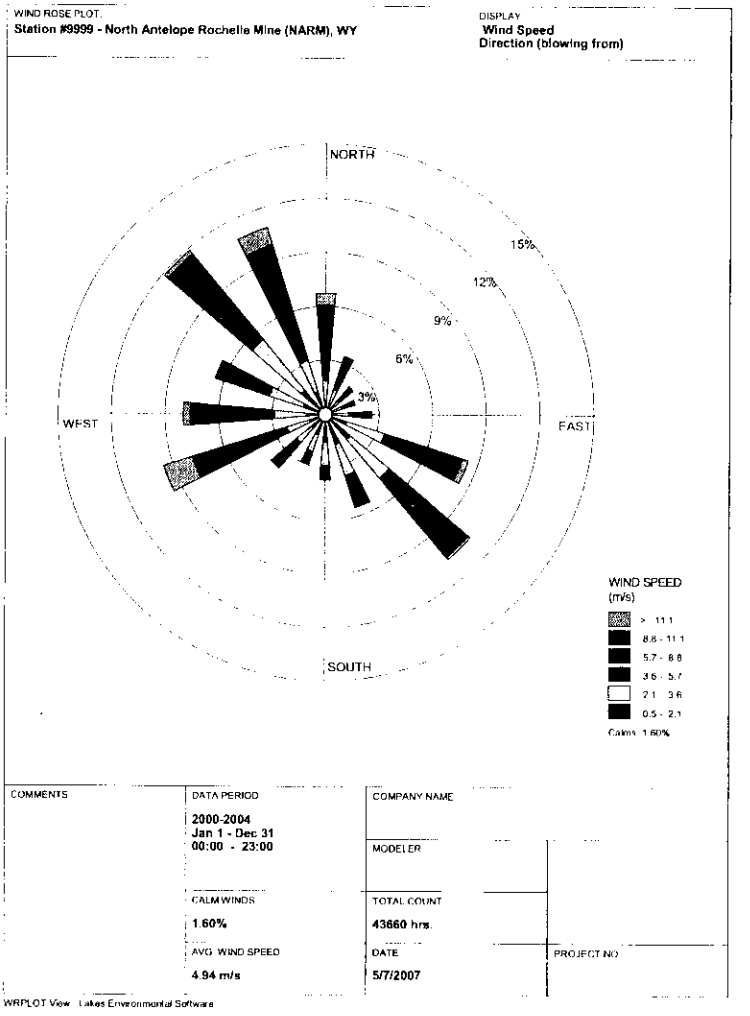
The modeling analysis was conducted to evaluate impacts from the Black Thunder Mine and the neighboring mines in the South Group of Mines in the PRB. Additionally, the NO_x ambient impact analyses included emissions from regional sources, including coal bed methane (CBM) facilities, power plants, highways, rail lines, and the town of Wright.

The ISCLT3 model simulations were run with the EPA-recommended regulatory default options, including rural dispersion coefficients with no exponential decay, final plume rise, default wind profile exponents, and default vertical potential temperature gradients.

10.1.3 Meteorological Data

The meteorological data used in the modeling analyses were based on hourly measured values of wind speed, wind direction, and wind direction fluctuations (stability) collected at the nearby North Antelope Rochelle Mine (NARM) during a five-year period from 2000 through 2004. The hourly meteorological data were converted into a joint frequency distribution (JFD) in the STability ARray (STAR) format recognized by the ISCLT3 model. A wind rose, which represents the average surface wind patterns during this time period, is shown in Figure 10-1.

Figure 10-1: Wind Rose for NARM (2000-2004)

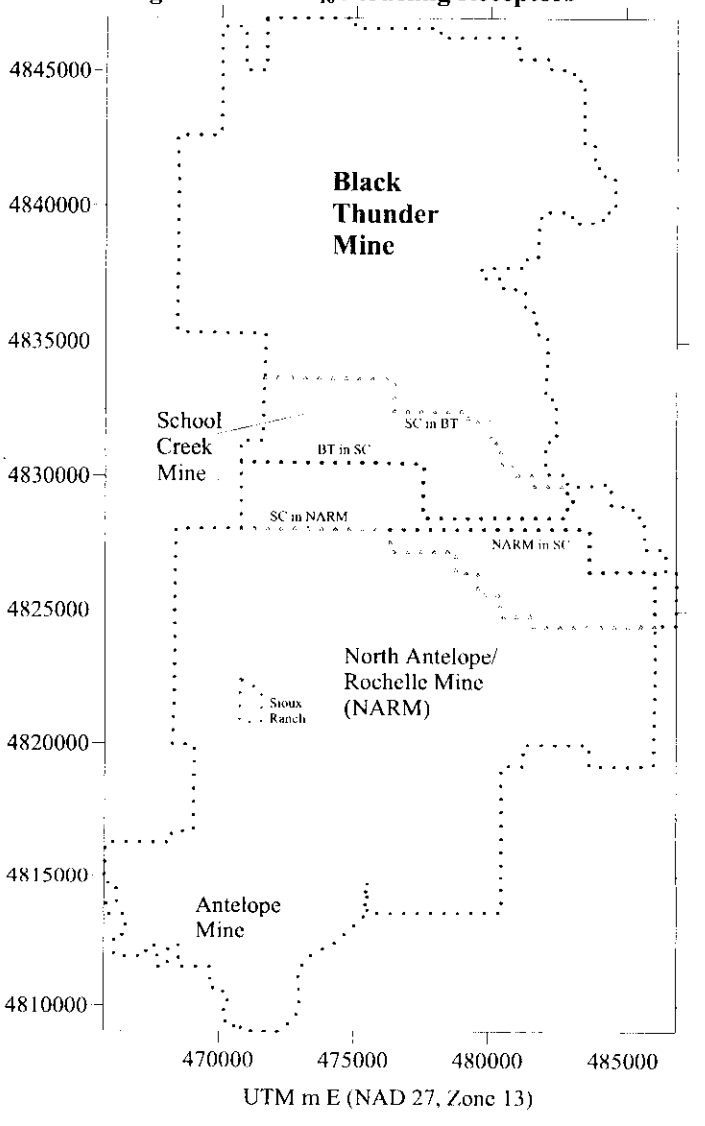


10.1.4 Modeling Receptors

The receptors used in the modeling analyses were developed separately for the PM_{10} and NO_2 modeling simulations. The modeling analysis for PM_{10} was conducted using discrete Cartesian receptors placed at 500-meter intervals along the LNCM boundaries for the South Group of Mines.

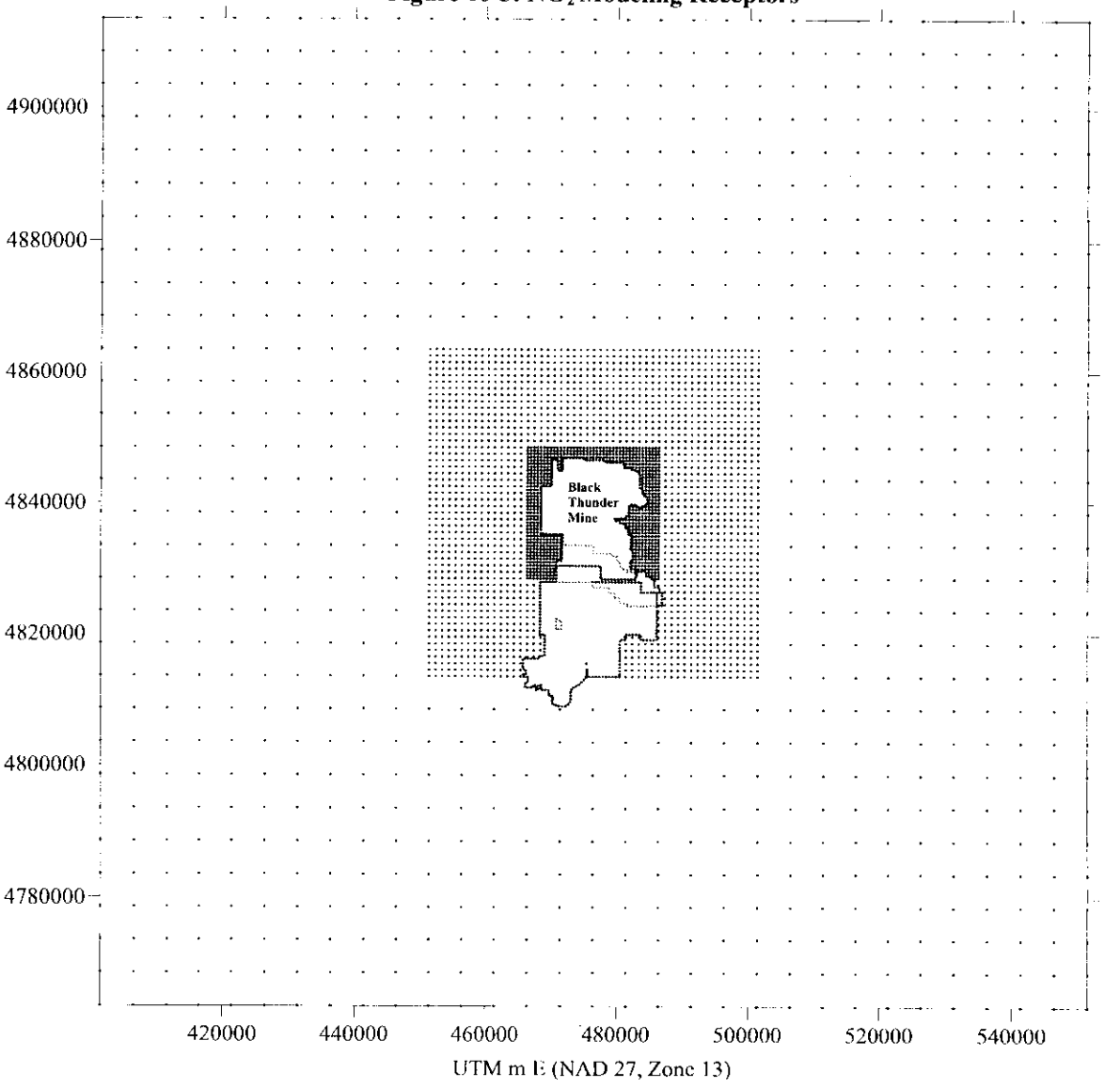
At School Creek Mine and NARM, receptors were placed along the overlapping LNCM boundaries to allow the AQD's "Mine A/Mine B" policy to be used. For example, in a case where a Black Thunder receptor is located within School Creek's LNCM, the contribution from School Creek is not added to the cumulative total, and vice versa. Figure 10-2 shows the receptor grid used for the PM_{10} modeling.

Figure 10-2: PM_{10} Modeling Receptors



The NO_2 receptor grid is shown in Figure 10-3. This grid, which included the LNCM receptors, was designed to capture the full extent of the significant impact from Black Thunder sources, i.e., the predicted impacts of 1.0 $\mu g/m^3$ or more for an annual averaging period.

Figure 10-3: NO_2 Modeling Receptors



10.2 ANALYSIS OF SHORT-TERM PM_{10} and $PM_{2.5}$ IMPACTS

10.2.1 Short-Term (24-hour) Modeling

As stated previously, current Division policy does not endorse short-term (24-hour) modeling exercises for predicting short-term ambient impacts from fugitive dust particulate emissions. Therefore, dispersion modeling was used to determine long-term (annual) average PM_{10} ambient concentrations only.

Section 234 of the 1990 Clean Air Act Amendments required the Administrator of the Environmental Protection Agency to analyze the accuracy of short-term modeling in regard to fugitive particulate emissions from surface coal mines. A June 26, 1996 EPA Region VIII letter to Wyoming Congressional Representatives states that the results of the study indicate the model fails to meet evaluation criteria and tends to overpredict 24-hour impacts from surface coal mines. The State and EPA Region VIII entered into a Memorandum of Agreement on January 24, 1994 (summarized in 60 CFR 47290 on 9/12/95) which allows the Division to conduct monitoring in lieu of short-term modeling for assessing particulate concentrations.

10.2.2 Historical Particulate Ambient Monitoring

Ambient air monitoring data has been collected by the mining community in the Powder River Basin for over twenty (20) years. Initially, concentrations were measured as TSP, but in 1989, PM_{10} monitors were being installed at various sites throughout the basin. All monitoring was being conducted on a one-in-six day schedule. However, in the early part of 2001, PM_{10} readings in excess of 150 $\mu g/m^3$ were being recorded in the southern area of the basin. In a letter from the Division dated October 26, 2001, the mines in the Powder River Basin (PRB) were notified that the waiver the Division had issued in 1997 allowing monitoring on a one-in-six day (1/6) schedule had been revoked. As of January 2002, all the PM_{10} monitoring sites in the PRB were required to conduct monitoring on a one-in-three day (1/3) schedule. This mandate did not apply to PM_{10} monitors currently operating on an everyday (1/1) schedule, PM_{10} monitors already on a 1/3 day schedule, or to any existing TSP monitors on a 1/6 day schedule. Additionally, a mine that had been monitoring TSP would be allowed to follow a one-in-six day sampling schedule until such time a 24-hour TSP concentration in excess of 150 $\mu g/m^3$ was recorded or an annual average TSP concentration in excess of 50 $\mu g/m^3$ was recorded.

10.2.2.1 Black Thunder Mine

Ambient particulate data (PM_{10}) at the Black Thunder Mine is currently gathered by a high volume sampler at site 25, low volume samplers at sites 9, JR-3, and JR-4, and continuous monitors at sites 12, 36, and JR-5. The high and low volume samplers monitor PM_{10} on a 1/3 day schedule. Meteorological data is also monitored at three (3) locations at the mine. The location of the monitoring sites and meteorological sites are shown in Figure 10-4. This figure is contained in the application as Figure 1.3 Black Thunder Mine Coal Air Monitor Site Locations. Table 10-1 presents that ambient monitoring data from 2007 through 3rd quarter 2010.

Figure 10-4 – Current Black Thunder Ambient Particulate Monitors

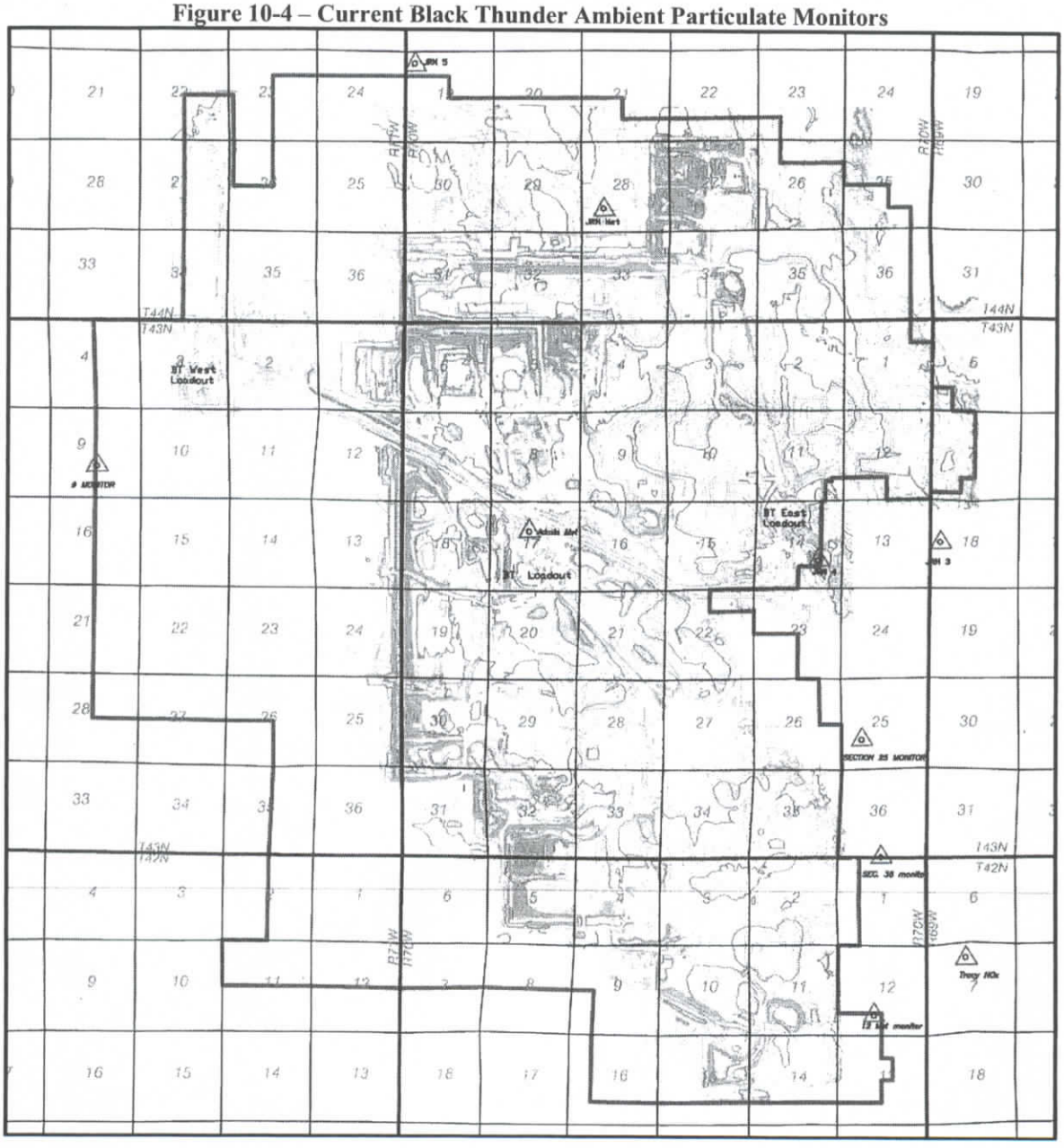


Table 10-1
Black Thunder Mine
Historical Ambient Data (μg/m³) and Production
(WAAQS PM_{10} Standards = 50 μg/m³ Annual, 150 μg/m³ 24-Hour)

Year	Site	Annual Average	High 24-Hour	2nd High 24-Hour	Coal MMtpy [2]	OB MMbcy [2]
2007	26	24.9	99	93	103.35	335.86
	12	30.9	128	116		
	36	34.3	136	136		
	JR-3	31.1	118	103		
	JR-4	18.2	51	49		
	JR-5	32.0	146	143		
2008	26	17.9	32	28	130.6	450.84
	25	12.3	44	33		
	9	21.3	96	84		
	12	28.7	174 [3]	92		
	36	31.1	233 [3]	98		
	JR-3	28.3	117	106		
	JR-4	15.3	58	48		
	JR-5	26.6	97	94		
2009	25	10.2	33	32	110.48	404.55
	9	15.0	62	49		
	12	20.1	91	72		
	36	21.4	87	73		
	JR-3	22.5	67	61		
	JR-4	12.2	34	33		
	JR-5	20.8	93	90		
2010 [1]	25	12.1	25	25	n/a	n/a
	9	16.2	45	44		
	12	21.6	89	82		
	36	21.9	129	93		
	JR-3	19.7	65	57		
	JR-4	12.6	36	33		
	JR-5	24.2	144	135		

[1] Data through the 3rd quarter of 2010
[2] Combine coal and overburden production for Black Thunder and Jacobs Ranch
[3] Notices of Violation (NOV) were issued for these exceedances

In January of 2007 a PM_{10} concentration greater than 150 μg/m³ was recorded at Site 36, and Thunder Basin Coal Company submitted a Natural Events Action Plant (NEAP) packet to the Division to flag the data due to high wind. The Division reviewed the packet and determined that the monitored concentration was the result of high wind, and that Thunder Basin Coal Company has satisfied the requirements of the NEAP in handling the event. The Division flagged the data, and the EPA subsequently concurred with flagging the data due to high wind.

In July of 2008 PM_{10} concentrations greater than 150 $\mu g/m^3$ were recorded at Sites 12 and 36. Thunder Basin submitted NEAP packets for these events, but the Division didn't concur with these submittals. Subsequently, Thunder Basin Coal Company was issued notice of violations 4558-09 and 4549-09 for these events in question. Because monitoring is done continuously at these sites, Appendix K procedures were applied to the monitoring data. The estimation was less than 1.0 exceedance per year for the 3-year (2007 through 2010) period. Therefore, the 12 and 36 monitoring sites do not fail the attainment test and continue to show attainment with the 24-hour PM_{10} standard. Therefore, based on a review of all of the ambient monitoring data from the Black Thunder Mine monitoring network, the data demonstrates that the Black Thunder Mine is in attainment with the 24-hour standard PM_{10}.

10.2.2.1.1 Monitor Siting

Since the issuance of air quality permit MD-3851, Thunder Basin Coal Company has been required to submit on an annual basis, a demonstration that the ambient particulate monitoring network is sufficient for monitoring impacts from current as well as future (5-year projection) mining activities. This demonstration has consisted of a discussion of the ambient monitoring network along with an annual windrose, and current UTM coordinate locations of the monitors. Additionally, a map showing current monitor locations in relation to active mining areas, along with projected mining areas, has been included. The monitor siting demonstration will be incorporated into this permit. Monitor locations and/or changes are dependent upon concurrence with the Air Quality Division – Monitoring Program, power availability for the sites, and landowner agreements for these sites.

10.2.2.1.2 Action Plan

Thunder Basin Coal Company has established a contingency action plan for high particulate events at the Black Thunder Mine. A copy of this plan titled *Dispatch Air Quality Event Action Plan* is attached to this analysis in Appendix A. This plan has been reviewed by the Division, and consists of actions that are to be taken if a continuous monitor value reachs a trigger level. The Division is incorporating, as a condition of the permit, a requirement that Thunder Basin Coal Company document what actions were taken when an action level was triggered under the air quality action plan. In addition, the Administrator may require a demonstration that the action plan is sufficient for minimizing particulate emissions based on a reading greater than 150 $\mu g/m^3$. A request from the Administrator for a demonstration of an action plan will be based on all the facts, such as the number, frequency and magnitude of the monitor reading(s) greater than 150 $\mu g/m^3$ (24-hour average from midnight to midnight).

10.2.2.1.3 Best Management Practices (BPM)

As discussed in the BACT analysis for disturbed acreage, the Division considers acreage within the mine boundary that is subject to wind erosion as disturbed acreage, and contemporaneous reclamation helps minimize wind erosion from mined areas. Currently, the Division is evaluating disturbed acreage as a source category where particulate emission reductions could be achieved. Based on information the Division has received under the NEAP, wind erosion from disturbed acreage directly influences monitored impacts at the mines. Thunder Basin Coal Company is required to follow Category I control measures under the NEAP which are considered BACT measures and are enforceable as permit requirements. Additionally, under the NEAP, Thunder Basin Coal Company can follow Category II and III control measures which are considered "Best Available Control Measures" and "Reactionary Control

Measures," respectively. These are measures a mine can implement prior to high wind events, and during high wind events, to help prevent high monitor readings such as ripping disturbed areas, and minimizing/shutting down activities in areas identified as being sources of emission during high wind events.

In order to develop a consistent approach across all coal mines for disturbed acreage, the Division is requiring the mines to document particulate emission reduction control measures and best management practices applied to disturbed acreage. On an annual basis, mines will be required to submit a report on the amount of disturbed acreage for the previous calendar year. The report is to contain the total acreages treated during the past calendar year using control measures or best management practices (BMP). This report will be part of the annual report required for dust control measures.

The Division will establish an acreage threshold of 150 contiguous acres where topsoiled areas greater than or equal to 150 contiguous acres that will not be revegetated within 60 days of completion of topsoil laydown and regraded backfill areas greater than or equal to 150 contiguous acres that will not be topsoiled within 60 days, shall be ripped or chiseled to create a roughened surface, seeded with a temporary vegetative cover, or otherwise effectively stabilized against wind erosion. For topsoiled areas less than 150 contiguous acres that will not be revegetated and regraded backfill areas less than 150 contiguous acres that will not be topsoiled, stabilization is required as soon as feasible.

10.2.2.2 South Group of Mines

Historical ambient monitoring discussed in this section will address only the southernmost group of mines which includes the Black Thunder, Jacobs Ranch (to be merged with Black Thunder), School Creek, North Antelope Rochelle, and Antelope mines. All the concentrations noted in the following discussions are reported at standard temperature and pressure (STP) conditions.

The North Antelope Rochelle Mine currently conducts ambient monitoring at three sites: NA-7, NA-8, and RO-1. These monitors operate on a continuous basis. The Antelope Mine currently conducts ambient monitoring at four sites: ANT-3, ANT-4, ANT-5, and ANT-6. The Antelope Mine ambient monitors operate on a 1 in 3 day schedule except for site ANT-3 which operates on a 1 in 6 day schedule. The Black Thunder and Jacobs Ranch ambient monitors were discussed in the previous section. The School Creek Mine has not begun operation; therefore, no monitors are currently in operation. Table 10-2 shows the monitored values for mines neighboring the Black Thunder Mine in the South Group for PM_{10}.

Table 10-2
Powder River Basin – South Group of Mines
Production and Historical Ambient Data
(WAAQS PM_{10} Standards = 50 µg/m^3 Annual, 150 µg/m^3 24-Hour)

Mine	Monitor ID	2010[1]		2009		2008	
		High 24-Hour	2nd High 24-Hour	High 24-Hour	2nd High 24-Hour	High 24-Hour	2nd High 24-Hour
Jacobs Ranch	JR-3	65	57	67	61	117	106
	JR-4	36	33	34	33	58	48
	JR-5	144	135	93	90	97	94
Black Thunder	26	--	--	--	--	32	28
	25	25	25	33	32	44	33
	9	45	44	62	49	96	84
	12	89	82	91	72	174	92
	36	129	93	87	73	233	98
North Antelope Rochelle	NA-5	--	--	127	85	153	136
	NA-7	59	53	61	57	72	69
	NA-8	107	105	74	74	--	--
	RO-1	148	122	132	108	139	128
Antelope	3	34	26	46	30	29	24
	4	56	55	62	61	116	93
	5	107	72	76	67	110	110
	6	152	108	154	106	112	87
Total Coal Production (MMTPY)		n/a		242.61		263.97	
Total Overburden Removal (MMBCY)		n/a		881.71		934.18	

[1] Data through the 3rd quarter of 2010

In looking at the annual ambient monitored PM_{10} concentrations within the South Group of Mines for the past three (3) years as presented in Table 10-2, there does not appear to be a direct correlation with coal and overburden production and monitored PM_{10} concentrations. It is difficult to determine if PM_{10} particulate concentrations are due solely to mining activity when concentrations could be due to a combination of factors, including drought conditions, coal bed natural gas production, and increased traffic on unpaved roads. However, based on a review of all of the ambient monitoring data from the South Group, the data demonstrates that the South Group is in attainment with the 24-hour standard PM_{10}.

10.2.3 Short-term (24-hour) $PM_{2.5}$ IMPACTS

The Division operates a $PM_{2.5}$ sampler at Black Thunder Mine's 36 monitoring site (shown in Figure 10-4). The sampler operates for 24 hours every 3rd day, in accordance with EPA sampling guidelines. Table 10-3 presents a summary of the recent data from the sampler, and all monitored values are well below the NAAQS.

Table 10-3: Monitored $PM_{2.5}$ at the Black Thunder Mine ($\mu g/m^3$)				
Year	Annual Average $PM_{2.5}$	Annual $PM_{2.5}$ NAAQS	98th Percentile 24-Hour Average $PM_{2.5}$	24-Hour $PM_{2.5}$ NAAQS
2007	6.59	15	19.0	35
2008	5.21		17.2	
2009	4.07		9.5	
3-Year Average	5.29		15.23	

Notes:
1) To attain the annual standard, the 3-year average of the annual mean $PM_{2.5}$ concentrations must not exceed 15.0 $\mu g/m^3$
2) To attain the 24-hour standard, the 3-year average of the 98th percentile of 24-hour concentrations must not exceed 35 $\mu g/m^3$

10.3 ANALYSIS OF LONG-TERM PM_{10} IMPACTS

10.3.1 PM_{10} Emission Inventories/Selection of Worst Case Years

The applicant developed a summary of the mining activity proposed for the Black Thunder Mine for all of the years in the mining plan, and then developed fugitive PM_{10} inventories from this information. Similar inventories were developed for the nearby mines, which include the existing School Creek, NARM, and Antelope mines. Because it is not practical to model all of the years in the life of the mines, the applicant compared life-of-mine fugitive emissions for the mines, and determined the years which would likely yield the highest modeled impacts. These "worst-case" years were modeled and the results were compared to the annual ambient air quality standard. If the maximum predicted impacts from the worst-case years are below the standard, then it is assumed that the impact from other years in the life of the mine will fall below the ambient standard.

Fugitive and point source emissions for the nearby mines were taken from the most recent permits or permit applications that reflect the currently permitted or proposed configurations at the mines. Annual fugitive PM_{10} emissions were summarized and evaluated, not just as to the highest total, but also the location of the mining activity in relation to LNCM boundaries. If the distance from the mining activity to the LNCM boundary is small, impacts to the receptors along the LNCM boundary may be higher. Point source emissions are assumed not to vary significantly from year to year and are usually excluded from the process of selecting the worst-case years.

Based on the operating parameters and projected fugitive PM_{10} emission inventories for the South Group of Mines, the years 2014 and 2015 were selected to represent the "worst-case" years to simulate in the modeling analyses for PM_{10}. Year 2015 was selected because it represented the highest emissions for the Black Thunder Mine and 2014 was chosen because it represented the highest total emissions from the South Group of Mines. Those two years were also used to model NO_2 impacts. Table 10-4 presents calculated fugitive PM_{10} emissions for the Black Thunder Mine for the two modeled years.

Table 10-4: Black Thunder Mine Estimated Fugitive PM_{10} Emissions (2014 and 2015)

Emission Source	2014 PM_{10} Emission Rate (tpy)	2015 PM_{10} Emission Rate (tpy)
Scraper	57.88	57.88
Overburden Removal (dragline)	883.71	894.82
Overburden Removal (shovel)	1,653.53	1,677.79
Coal Removal (shovel)	59.85	59.85
Coal Dumping	54.51	54.51
Wind Erosion	735.83	681.15
Overburden Haul Road	692.11	704.46
Coal Haul Road	769.22	815.97
Grader	302.77	305.74
Dozer	360.55	365.08
Water Trucks	61.92	62.52
Overburden Blasting	1.82	1.89
Coal Blasting	5.34	5.34
Overburden Drilling	0.15	0.15
Coal Drilling	0.08	0.08
Totals	5,639	5,687

tpy = tons per year

Calculated fugitive emissions as presented by the applicant for the South Group of Mines are shown in Table 10-5.

Table 10-5: South Group of Mines Fugitive PM_{10} Emission Summaries (tpy)					
Year	School Creek	NARM	Antelope	Black Thunder	Totals
2010	795	2,262	1,268	4,871	9,196
2011	689	2,570	1,194	5,137	9,590
2012	794	2,655	1,422	5,345	10,216
2013	896	2,670	1,098	5,525	10,189
2014	1,017	2,719	1,169	5,639	**10,544**
2015	1,050	2,385	1,021	**5,687**	10,143
2016	915	2,745	1,000	5,582	10,242
2017	992	3,093	782	5,234	10,101
2018	1,034	2,869	451	5,370	9,724
2019	1,081	1,163	213	5,638	8,095
2020	1,108	1,112	265	4,515	7,000
2021	1,251	957	--	3,628	5,836
2022	1,157	--	--	4,105	5,262
2023	1,133	--	--	4,425	5,558
2024	1,149	--	--	4,823	5,972
2025	1,122	--	--	--	1,122
2026	1,125	--	--	--	1,125
2027	1,095	--	--	--	1,095
2028	1,137	--	--	--	1,137
2029	832	--	--	--	832

tpy = tons per year

The emission rates associated with each of the mines for the worst-case years were verified by the Division, and these calculations are contained in Appendix B (2014) and C (2015) of this analysis.

10.3.2 Emissions Apportioning

Fugitive emissions for the worst-case years were apportioned into multiple area and volume sources based on the location and extent of mining activities.

A detailed accounting of the apportioned particulate emissions and sources is contained in the permit application. The area/volume sources that were used to represent the 2014 and 2015 PM_{10} emissions at the mines in the South Group are shown in Figures 10-5 and 10-6.

Fugitive and point source emissions for NARM were taken from the permit application for Permit MD-6375. Fugitive and point source emissions for the Antelope Mine were taken from the permit application for Permit MD-4809, and similar information for the School Creek Mine was obtained from the permit application for Permit MD-6445.

Figure 10-5: Fugitive PM_{10} Sources for 2014

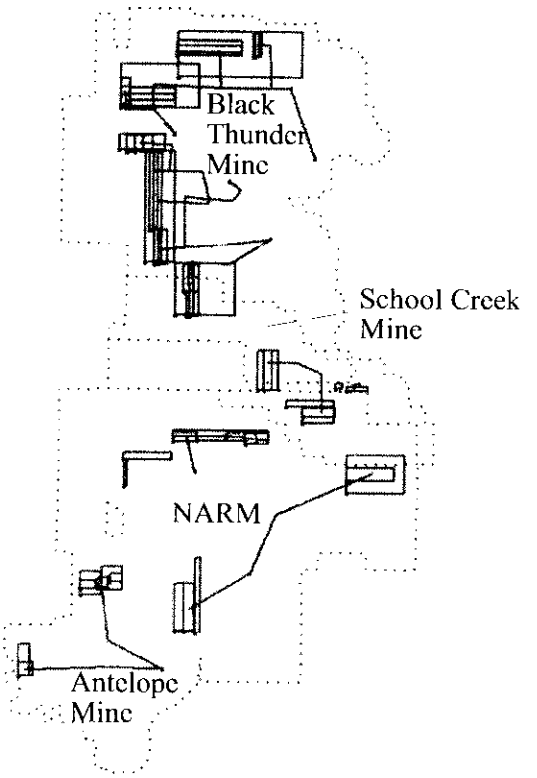
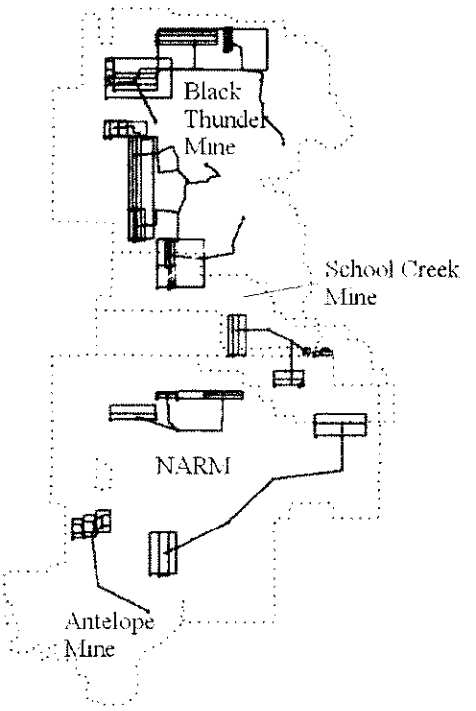


Figure 10-6: Fugitive PM_{10} Sources for 2015



10.3.3 PM_{10} Background Concentration

The Division requires that all mines in the PRB submit and justify an annual background PM_{10} concentration to represent all background sources that are not explicitly input to dispersion modeling analyses. The applicant determined that a background concentration of 14.9 $\mu g/m^3$ was appropriate for the mine, and the Division concurred.

10.3.4 PM_{10} Dispersion Modeling Results

To arrive at total predicted impacts for 2014 and 2015, the contributions from each mine were summed and the annual background level was added. The Division employed the "Mine A/Mine B" policy where appropriate for evaluating the final predicted ambient PM_{10} concentrations.

The maximum model-predicted PM_{10} concentration for 2014, including background, was 43.6 μg/m^3. This impact was predicted to occur along the northern LNCM of the Black Thunder Mine. For 2015, the maximum model-predicted concentration, with background, was 48.6 μg/m^3 at the same receptor on the northern LNCM of the Black Thunder Mine. All modeled impacts were below the WAAQS. Results of the modeling are summarized in Table 10-6. Figure 10-7 shows the locations of the maximum predicted impacts.

Table 10-6: Summary of Modeled Annual PM_{10} Impacts

Year	UTM Location		Predicted PM_{10} Impact (μg/m^3)	Background Concentration (μg/m^3)	Total Predicted Impact (μg/m^3)	WAAQS (μg/m^3)
	X (m)	Y (m)				
2014	475298	4846610	28.7	14.9	43.5	50
2015	475298	4846610	33.7		48.6	

Note: UTM Coordinates are expressed in NAD 27, Zone 13.

10.3.5 $PM_{2.5}$ Dispersion Modeling

Thunder Basin Coal used the ISCLT model to predict the impacts of $PM_{2.5}$ in the vicinity of the South Group of Mines. Fugitive $PM_{2.5}$ emissions from Black Thunder and surrounding mines were estimated by applying $PM_{2.5}/PM_{10}$ ratios to the estimated PM_{10} emissions. The $PM_{2.5}/PM_{10}$ ratios were taken from an analysis performed for the Western Regional Air Partnership (WRAP), and included ratios of 0.15 for wind erosion and 0.10 for all other mining sources. For other non-fugitive sources, Thunder Basin Coal assumed a 100% $PM_{2.5}/PM_{10}$ ratio.

A background $PM_{2.5}$ concentration of 6.54 was taken from data collected at the Black Thunder Mine. As with the analysis for PM_{10}, the Division employed the "Mine A/Mine B" policy where appropriate for evaluating the final predicted ambient $PM_{2.5}$ concentrations.

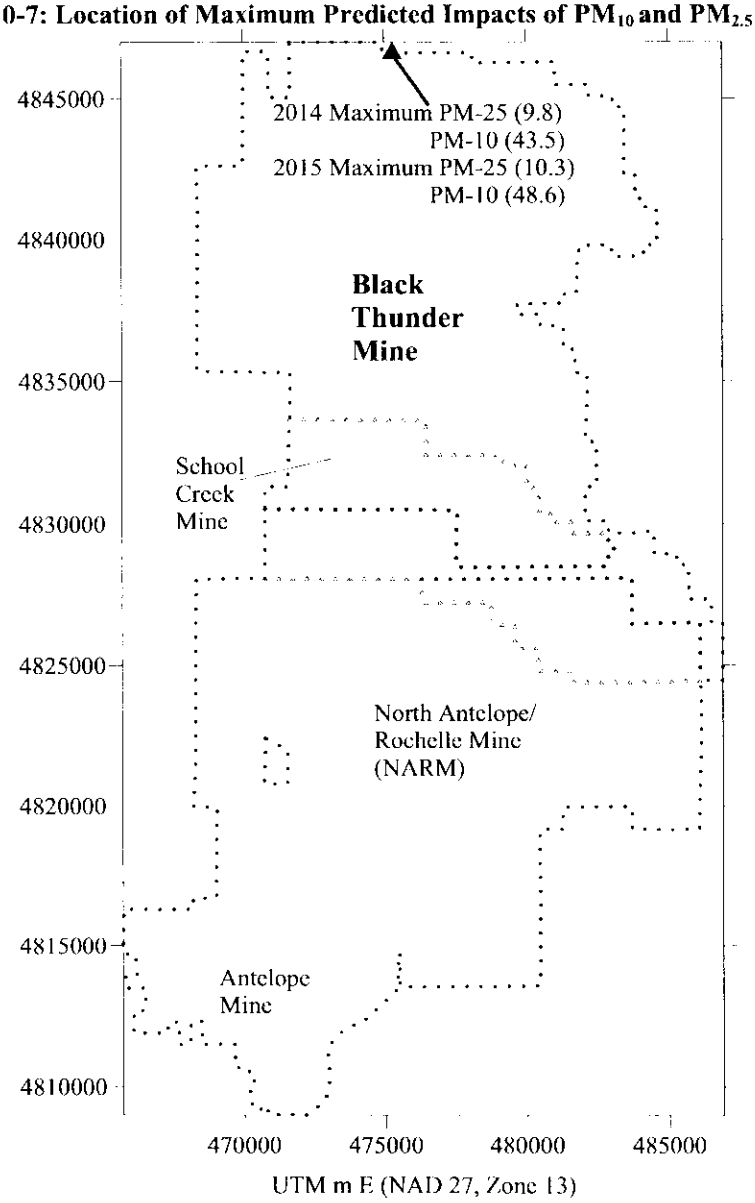
The maximum model-predicted $PM_{2.5}$ concentration for 2014, including background, was 9.8 μg/m^3. This impact was predicted to occur along the northern LNCM of the Black Thunder Mine. For 2015, the maximum model-predicted concentration, with background, was 10.3 μg/m^3 at the same receptor on the northern LNCM of the Black Thunder Mine. All modeled impacts were below the WAAQS. Results of the modeling are summarized in Table 10-7, and Figure 10-7 shows the locations of the maximum predicted impacts.

Table 10-7: Summary of Modeled Annual $PM_{2.5}$ Impacts

Year	UTM Location		Predicted $PM_{2.5}$ Impact (μg/m^3)	Background Concentration (μg/m^3)	Total Predicted Impact (μg/m^3)	WAAQS (μg/m^3)
	X (m)	Y (m)				
2014	475298	4846610	3.2	6.54	9.8	15
2015	475298	4846610	3.7		10.3	

Note: UTM Coordinates are expressed in NAD 27, Zone 13.

Figure 10-7: Location of Maximum Predicted Impacts of PM_{10} and $PM_{2.5}$ ($\mu g/m^3$)



10.4 ANALYSIS OF LONG-TERM NO_2 IMPACTS

For purposes of determining compliance with the Wyoming Ambient Air Quality Standard (WAAQS) for NO_2 of 100 $\mu g/m^3$ (annual average), the applicant submitted dispersion modeling analyses for NO_x sources at the Black Thunder Mine, along with neighboring mines and regional NO_x sources. The modeled NO_x concentrations were converted to nitrogen dioxide (NO_2) concentrations using EPA's default Ambient Ratio Method (ARM). EPA guidance, contained in Supplement C (EPA-450/2-78-027R-C) to the Guideline on Air Quality Models allows the use of the ambient ratio method, which provides for a 25% reduction in modeled NO_x concentrations for purposes of estimating NO_2 concentrations.

10.4.1 NO_x Emission Inventories

Thunder Basin Coal Company modeled NO_x emissions from several types of sources at the Black Thunder Mine, including haul trucks, graders, scrapers, dozers, water trucks, and fugitive NO_x emissions from blasting. Additionally, NO_x emissions from locomotive sources operating within the Black Thunder Mine rail loops and the rail loops for the other mines in the South Group were included in the NO_x modeling analyses.

10.4.2 Tailpipe and Fugitive Sources

The main sources of gaseous emissions at the Black Thunder Mine are from tailpipes of the heavy-duty diesel powered mining equipment, railroad locomotives operating on the mine property, and detonation of explosives. A NO_x emissions inventory consisting of tailpipe and fugitive sources at the Black Thunder Mine was prepared based on operating statistics and mine plan for the two years chosen for modeling, 2014 and 2015.

Mobile source emissions from haul trucks, scrapers, graders, and dozers were calculated by the applicant using emission factors from the 4th edition of AP-42 Volume II, Mobile Sources (EPA, 1985) and operating statistics. Locomotive emissions were calculated using the EPA-recommended emission factor for line haul locomotives from Procedures for EI Preparation, Vol. IV: Mobile Sources, EPA-450/4-81-026d (EPA, 1992). The NO_x emission factor for blasting with ammonium nitrate and fuel oil (ANFO) was obtained from the 5th edition of AP-42, Section 13.3 (EPA, 1995).

NO_x emissions from all mining activities in the South Group of Mines were modeled as area or volume sources. Emission sources included 1) NO_x tailpipe emissions from mobile sources, such as haul trucks, graders, and dozers moving along the haul roads, 2) NO_x from fugitive sources emitting throughout the pit areas (modeled as pit area sources), and 3) locomotives operating within the mine loop (modeled as volume sources linked together).

NO_x emissions from mobile sources operating within the pit areas were assumed to occur in all active areas, and blasting emissions were assumed to occur only within the location of the pit for the current year.

A breakdown of the tailpipe, locomotive, and fugitive emissions in tons per year (tpy) that were included in the applicant's modeling analyses for the Black Thunder Mine are provided in Table 10-8. This data was tabulated for the two (2) worst-case years, and were calculated based on an operational schedule of 8,760 hours/year.

Table 10-8
Black Thunder Mine
Annual NO_x Emissions Used in 2014 and 2015 Modeling Analyses

Emission Source	NO_x Emission Rate (tpy)	
	2014	**2015**
Haul Trucks	2,612	2,663
Graders	62	62
Dozers	261	264
Scrapers	64	64
Water Trucks	132	133
Locomotives	273	273
Blasting	3,155	3,254
Totals	**6,558**	**6,713**

10.4.3 NO_x Emission from the South Group of Mines

The same source characterizations and emissions apportionment techniques that were used to model NO_x sources at the Black Thunder Mine were also used to model NO_x sources at the neighboring mines. A summary of the NO_x emissions inventory for all of the mines in the South Group that were represented in the model simulations for 2014 and 2015 are provided in Table 10-9.

Table 10-9
South Group of Mines (PRB)
NO_x Emissions used in WAAQS Modeling Analyses (tpy)

Year	Black Thunder	NARM	Antelope	School Creek	Total
2014	6,558	3,321	1,295	1,039	12,213
2015	6,713	3,128	1,050	1,143	12,034

Fugitive and point source emissions for NARM were taken from the permit application for Permit MD-6375. Fugitive and point source emissions for the Antelope Mine were taken from the permit application for Permit MD-4809, and similar information for the School Creek Mine was obtained from the permit application for Permit MD-6445.

10.4.4 NO_x Emission Inventory Development for Regional Sources

The Division has specified three (3) large rectangular inventory areas for the North, Middle, and South Group of Mines to be used as a basis for defining and extracting a regional emissions inventory for each group of mines using the Northeast Wyoming Inventory database. Emission sources that are located within these rectangular search areas are included in the NO_x modeling analyses for each respective group of mines.

The Black Thunder Mine is located in the South Group inventory area. This particular inventory area is approximately 40 km (east-west) by 46 km (north-south), and includes the neighboring mines in the South Group: School Creek, NARM, and Antelope. The UTM Coordinates that define the boundaries of the South Group inventory area are provided below:

South Group Search Area
UTM Coordinates (Zone 13) NAD27

Easting (meters)	Northing (meters)
450,000	4,806,400
450,000	4,852,400
490,000	4,852,400
490,000	4,806,400

A regional NO_x emissions inventory was provided to the applicant by the Division, based on data contained in the Division's Northeast Wyoming Inventory Database; the subset of emissions corresponding to this particular inventory area consists of actual NO_x emissions for coal mines in the South Group, the north/south main line railroad, mobile (Highway 59 and other small road segments), the town of Wright, Wyoming, all power plants in Campbell County, as well as permitted NO_x emission rates for point sources throughout Northeast Wyoming, which include compressor stations supporting oil/gas and coal bed methane production.

The regional NO_x emission sources that were represented in the modeling analyses for 2014 and 2015 are shown in Table 10-10.

Table 10-10
Regional NO_x Emissions Summary (tpy)

Worst-Case Years	Mainline Rail	Point Sources	Highways	Urban	Total
2014/2015	1,946	22,090	108	21	24,165

10.4.5 NO_2 Background Concentration

A background NO_2 concentration of 14 $\mu g/m^3$ was taken from ambient monitoring conducted at the Belle Ayr Mine. The Division considers the Belle Ayr Mine NO_2 ambient data to be the best available estimate of background NO_2 concentration for the project area.

10.4.6 NO_x Dispersion Modeling Results

For each receptor used in the 2014 and 2015 WAAQS modeling analysis, the AQD determined the modeled concentration from each source group, including the contribution from each of the mines, power plants, other point sources, highways, urban areas, and mainline rail sources. The Division employed the "Mine A/Mine B" policy for evaluating ambient NO_x concentrations where appropriate. Raw model results for NO_x were multiplied by the *national default ratio* 0.75 to account for partial chemical conversion to NO_2, and the background concentration of 14 $\mu g/m^3$ was added to the modeled concentrations.

For the emission projection year 2014, the maximum model-predicted NO_x concentration was 53.2 $\mu g/m^3$ at a receptor on the LNCM between the Antelope Mine and NARM. For the emission projection year 2015, the maximum model-predicted NO_x concentration was 53.9 $\mu g/m^3$ at a receptor on the northeast portion of the School Creek Mine LNCM. Table 10-11 provides a summary of the modeling results, and Figure 10-8 shows the locations of the maximum predicted impacts.

Table 10-11: Summary of Modeled NO_2 Impacts

Year	UTM Location		Predicted NO_2 Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Predicted Impact ($\mu g/m^3$)	Wyoming Standard ($\mu g/m^3$)
	X (m)	Y (m)				
Maximum Predicted Impacts						
2014	475483	4814662	39.2	14	53.2	100
2015	484489	4828965	39.9		53.9	

Note: UTM Coordinates are expressed in NAD 27, Zone 13.

10.5 ANALYSIS OF 1-HOUR NO_2 IMPACTS

Thunder Basin Coal Company operates a NO_x monitor near the Black Thunder Mine referred to as the Tracy Ranch Monitor. Table 10-12 present a summary of the data from the sampler, and all monitored values are well below the NAAQS.

Table 10-12: Monitored NO_2 at the Black Thunder Mine

Year	Annual Average NO_2 ($\mu g/m^3$)	Annual NO_2 NAAQS ($\mu g/m^3$)	98th Percentile 1-Hour Average NO_2 (ppb)	1-Hour NO_2 NAAQS (ppb)
2007	7.0	100	34.2	100
2008	6.1		30.0	
2009	7.5		30.7	
3-Year Average	--		31.6	

Note: To attain the 1-hr NO_2 standard, the 3-year average of the 98th percentile of the daily maximum 1-hour averages must not exceed 100 ppb.

Statewide monitoring of NO_2 on the basis of a 1-hour averaging period indicates that the 1-hour NAAQS of 100 ppb is not threatened at any of twelve monitoring sites through 2009 (see Figure 10-9). Several of the Wyoming monitors are located in areas of concentrated industrial development. County-wide NO_x emissions in Sweetwater County were more than 32,000 tons in 2005 (WRAP, EDMS). Multiple monitors are also located in Campbell County (32,837 tons of NO_x in 2005) and Sublette County (estimated 7,212 tons NO_x in 2008). Based on the current statewide 1-hour NO_2 monitoring and the monitored NO_2 data from the Tracy Ranch Monitor, the Division is satisfied that the operation of the Black Thunder Mine will not prevent the attainment or maintenance of the 1-hour NAAQS for NO_2.

Figure 10-8: Locations of Maximum Predicted NO_2 Modeling Impacts ($\mu g/m^3$)

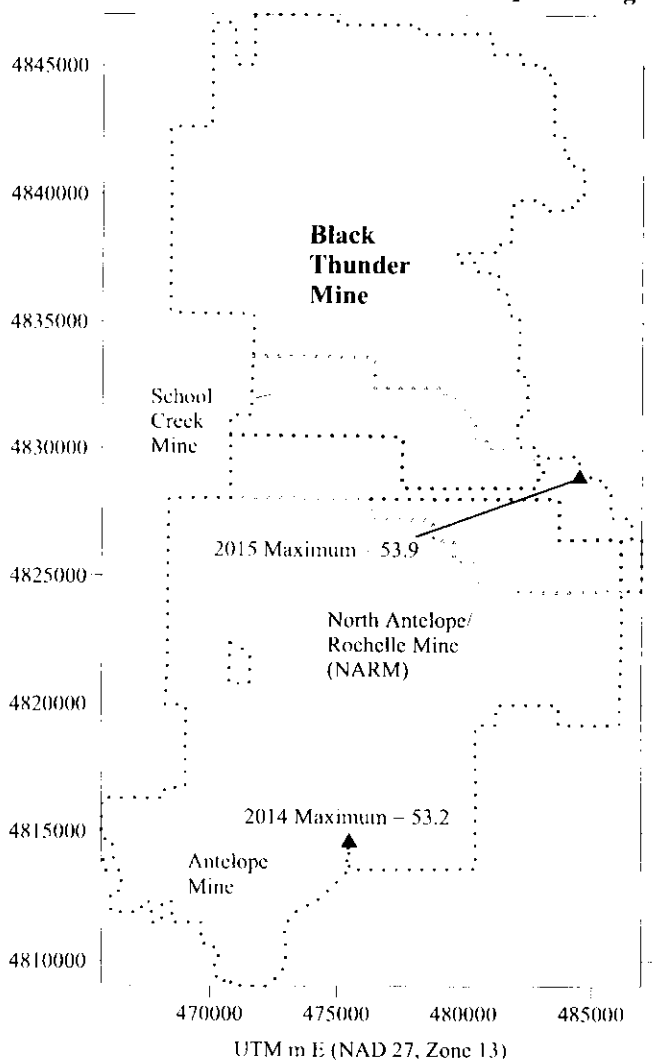
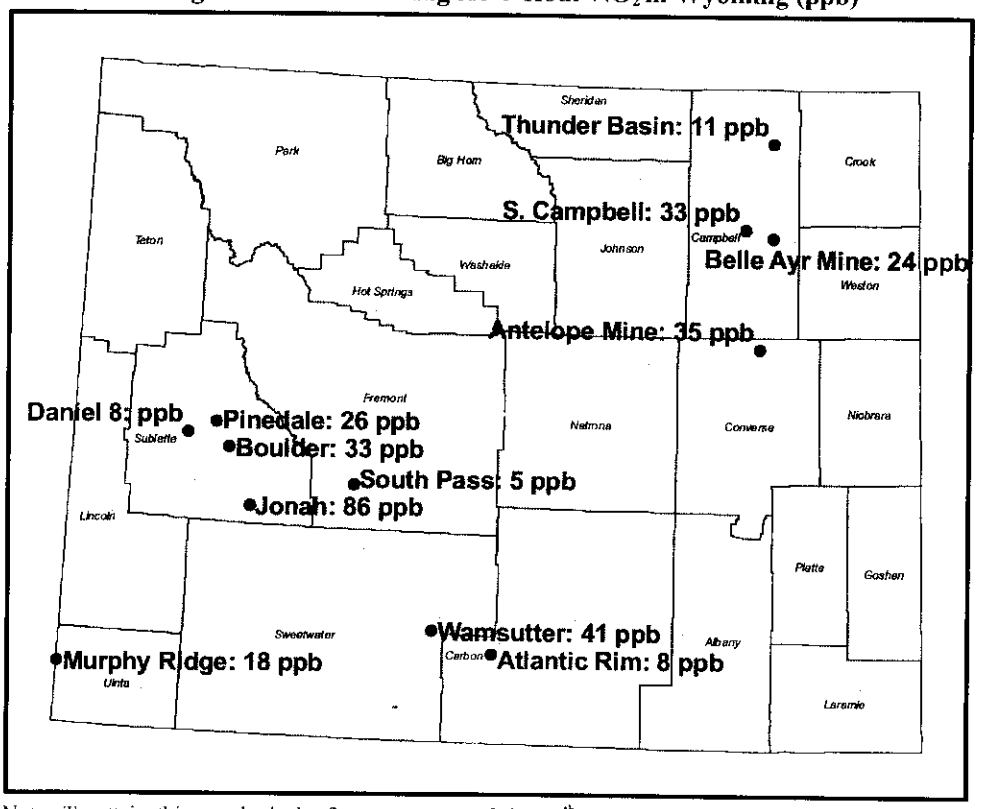


Figure 10-9: Monitoring for 1-Hour NO_2 in Wyoming (ppb)



Note: To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour averages must not exceed 100 ppb. Values reported from Wyoming monitoring stations are 1-year or 3-year averages of the 98th percentile of the daily maximum 1-hour averages.

11.0 CONCLUSIONS AND PROPOSED PERMIT CONDITIONS

With continued emphasis on application of BACT and BMP work practices, and on continued operation of an approved ambient monitoring network, the Division is satisfied that the proposed mine plan changes at the Black Thunder Mine can be implemented while maintaining ambient air quality standards.

Specifically, the applicant's dispersion modeling analyses were conducted using U.S. EPA approved models and methodologies, and the Division has reviewed and verified the source parameters, default settings, and related modeling inputs used in the applicant's modeling analyses. Through the required dispersion modeling analyses, the applicant has successfully demonstrated to the Division that all applicable air quality standards will be attained if the proposed changes in the applicant's mine plan and mining operations are approved. Therefore, the Division is proposing to issue a modification permit to Thunder Basin Coal Company for the Black Thunder Mine with the following conditions:

1. That authorized representatives of the Division of Air Quality be given permission to enter and inspect any property, premise or place on or at which an air pollution source is located or is being constructed or installed for the purpose of investigating actual or potential sources of air pollution and for determining compliance of non-compliance with any rules, standards, permits or orders.

2. That all substantive commitments and descriptions set forth in the application for this permit, unless superseded by a specific condition of this permit, are incorporated herein by this reference and are enforceable as conditions of this permit.

3. That a permit to operate, in accordance with Chapter 6, Section 2(a)(iii) of the WAQSR, is required after a 120-day startup period in order to operate this facility.

4. That all notifications, reports and correspondences associated with this permit shall be submitted to the Stationary Source Compliance Program Manager, Air Quality Division, 122 West 25th Street, Cheyenne, WY 82002 and a copy shall be submitted to the District Engineer, Air Quality Division, 2100 West 5th Street, Sheridan, WY 82801.

5. That written notification of the anticipated date of initial startup of the change in coal removal progression, in accordance with Chapter 6, Section 2(i) of the WAQSR, is required not more than sixty (60) days or less than thirty (30) days prior to such date. Notification of the actual date of startup is required within fifteen (15) days after startup.

6. That the following requirements shall be met for all atomizer/fogger systems at the Black Thunder Mine:

    a. The atomizer/fogger systems shall be operated and maintained so the system enclosure exhibits no visible emissions as determined by Method 22 of appendix A, 40 CFR part 60.

    b. That the atomizer/fogger systems and associated monitoring equipment shall be operated during all times that the respective coal preparation facilities are in operation.

c. Thunder Basin Coal Company shall conduct, at minimum, daily visual observations of the atomizer/fogger systems to determine the presence of visible emissions. Records shall be kept documenting whether visual emissions are noted and the corrective action taken. These records shall be maintained for a period of five (5) years and shall be made available to the Division upon request.

d. Thunder Basin Coal Company may utilize 40 CFR §60.255(f) of Subpart Y in lieu of utilizing (b) of this condition to demonstrate continuous compliance with (a) of this condition.

7. That the following sources shall be controlled with atomizer/fogger systems:

Source Description
Black Thunder
Primary Crusher
Secondary Crusher
Belt 2902 Transfer
Belt 2903 Transfer
North Silo Headhouse
Belt 2901 Transfer
Belt 612 Transfer
Belt 626 Transfer
Belt 609 Transfer
Near Pit Crusher #1
Near Pit Crusher #2
Near Pit Overland Conveyor Transfer
5-West Crusher
West Black Thunder
West Crusher
West Overland Conveyor Transfer
East Black Thunder
East Circuit #4 ROM Conveyor
East Circuit #4 Overland Conveyor
East Circuit #4 Surge Bin
East Circuit #1 South Transfer
East Circuit #2 North Transfer
East Circuit #2 Storage Conveyor
East Circuit #1 Storage Conveyor
East Circuit #3 Storage Conveyor
East #5 Belt
East #6 Belt
East #8 Belt
East #A4 Belt
East #9 Belt
East #A2 Belt

8. That Thunder Basin Coal Company shall comply with the applicable requirements of 40 CFR part 60, subpart Y.

9. That Thunder Basin Coal Company shall conduct the following for the coal truck dumps at the Black Thunder Mine:

   i. Thunder Basin Coal Company shall conduct, at minimum, a control effectiveness demonstration on each truck dump each calendar quarter. Control effectiveness for each truck dump control system shall be determined by using the methodology in 40 CFR §60.255(h)(1)(i) and (ii). The Division shall consider the threshold defining relative control effectiveness to be no greater than twenty percent (20%) opacity for each truck dump. Observations shall be conducted by an observer certified in accordance with Section 3.1 of Method 9.

   ii. A control effectiveness demonstration with an opacity of 20 percent or greater shall prompt immediate inspection and, if necessary, corrective action. Corrective action must be initiated when the control device is determined to be improperly maintained or operated as determined by inspection. Thunder Basin Coal Company shall document any inspection of the truck dumps control system(s) and any corrective actions taken. The duration of any corrective action taken to resolve any items found during an inspection shall be noted along with any justification for delays. Upon completion of the corrective action at the truck dump, Thunder Basin Coal Company shall conduct a demonstration of the control effectiveness of the truck dump control system, as described in (i) of this condition.

10. That the coal truck dumps shall be limited to less than 20 percent (20%) opacity, per the requirements of Subpart Y. Compliance with the 20 percent opacity limit at the coal truck dumps will be determined by Method 9 of appendix A, 40 CFR part 60.

11. That Thunder Basin Coal Company shall conduct an annual Method 9 observation (one 6-minute average) of each coal truck dump to measure the opacity of any fugitive emissions. The Method 9 observations shall be conducted by an observer certified in accordance with Section 3.1 of Method 9 and shall follow the requirements and procedures of Method 9 as contained in 40 CFR part 60, appendix A.

12. That Thunder Basin Coal Company shall conduct, at minimum, weekly inspections of the truck dump control systems installed at each coal truck dump to determine any repair measures necessary to minimize fugitive dust emissions and maintain proper operation of the control system. Corrective action and repair measures must be initiated in an expeditious manner when the control device is determined to be improperly maintained or operated.

13. The coal truck dump pads shall be cleaned, treated, and maintained to minimize the coal fines that accumulate due to spillage from the trucks. Cleaning practices or treatment of the road surfaces shall be maintained on a continuous basis to the extent that cleaning or the surface treatment remains a viable control measure that will be adequate to control fugitive dust emissions.

14. That all permanent haul roads shall be treated with a chemical dust suppressant in addition to water to control fugitive dust emissions, and shall be maintained continuously to the extent that such treatment remains a viable control measure.

15. That all temporary haul routes, including pit floor haul routes, shall be treated with water and/or chemical dust suppressants to control fugitive dust emissions, on a schedule such that treatment remains a viable control measure.

16. That Thunder Basin Coal Company shall submit to the Division by April 1st of each year, a report addressing road dust control measures employed during the past year and a disturbed acreage report for the year. This plan shall include the following:

    a. A map based on the past year end conditions with the following information:
        - All roads existing at the end of the calendar year, which have been treated with water and/or dust suppressant.
        - Locations of active operations, treated disturbed areas, and reclaimed areas.
    b. Type and annual quantity of dust suppressants used for the past year and a description of the general application procedures and schedule.
    c. Number of water trucks, capacities of each water truck, and quantity of water used for the past year.
    d. Operating hours by water truck and total water truck fleet hours for the past year.
    e. Total length in miles of permanent and temporary haul roads existing at the end of the calendar year, which have been treated with water and/or dust suppressant.
    f. Overburden and coal production rates for the past year.
    g. A table summarizing, by calendar quarter, the acreages and control measures or BMP uses/applied by active operations, treated disturbed areas, and reclaimed areas.

17a. Topsoiled areas greater than 150 contiguous acres that will not be revegetated within 60 days of completion of topsoil laydown and regraded backfill areas greater than 150 contiguous acres that will not be topsoiled within 60 days, shall be ripped or chiseled to create a roughened surface, seeded with a temporary vegetative cover, or otherwise effectively stabilized against wind erosion.

17b. Topsoiled areas less than 150 contiguous acres that will not be immediately revegetated and regraded backfill areas less than 150 contiguous acres that will not be topsoiled for an extended period of time, shall be ripped or chiseled to create a roughened surface, seeded with a temporary vegetative cover, or otherwise effectively stabilized against wind erosion as soon as feasible.

18. That Thunder Basin Coal Company shall utilize a program to mitigate coal fires that result from spontaneous combustion. Attempts to extinguish coal fires must be initiated within twenty-four (24) hours of discovering the fire and pursued until the fire is extinguished, unless operational safety issues are present. For all coal fires where efforts to extinguish the fire were not initiated within twenty-four (24) hours, or for fires which were not extinguished within twenty-four (24) hours of the initial attempt to extinguish the fire, Thunder Basin Coal Company shall document the measures taken to extinguish the fire and the reasons for any delays.

19. That Thunder Basin Coal Company shall operate, in accordance with the requirements of 40 CFR parts 50 and 58 an approved ambient monitoring program that includes an ambient NO_2 and PM_{10} monitoring network at the Black Thunder Mine to demonstrate compliance with the ambient PM_{10} standards in Chapter 2, Section 2 of the WAQSR. Thunder Basin Coal Company shall maintain a quality assurance plan for the monitoring network, as required by 40 CFR part 58 and shall be approved by the Division.

20. Thunder Basin Coal Company shall comply with all commitments made in the quality assurance plan for the ambient NO_2 and PM_{10} monitoring network in Condition 19 for the Black Thunder Mine, and the data generated by the ambient NO_2 and PM_{10} monitoring network shall be submitted in a Division approved format on a quarterly basis, within 60 days following the end of the quarter.

21. Thunder Basin Coal Company shall notify the Division within 15 days of a monitored exceedance at any of the continuous monitors, and within 30 days of a monitored exceedance at any filter based monitor in the ambient PM_{10} monitoring network at the Black Thunder Mine.

22. That annually, Thunder Basin Coal Company shall submit to the Division, a demonstration that the ambient PM_{10} monitoring network is sufficient for monitoring impacts and demonstrating compliance with the ambient particulate standards in Chapter 2, Section 2 of the WAQSR from current as well as future (5-year projection) mining activities. This demonstration shall consist of a discussion of the ambient monitoring network along with an annual windrose, and current UTM coordinate locations of the monitors. In addition, a map showing current monitor locations in relation to active mining areas along with projected mining areas shall be included. The ambient monitoring network demonstration shall be submitted along with the annual report required for dust control measures in Condition 16, and a copy shall be submitted to the Air Quality Monitoring Program located in Cheyenne. The Administrator may require Thunder Basin Coal Company to modify their ambient monitoring network, including monitor locations, based on a review of the demonstration.

23. That Thunder Basin Coal Company shall adhere to their contingency action plan for high particulate events at the Black Thunder Mine. A copy of this plan titled *Dispatch Air Quality Event Action Plan* is attached in Appendix A. The contingency action plan for high ambient particulate impacts may be revised without administratively amending the permit, but revisions shall be approved by the Division prior to implementation.

24. That Thunder Basin Coal Company shall submit, if required by the Administrator, a demonstration that their *Dispatch Air Quality Event Action Plan* will adequately minimize high ambient particulate impacts. The Administrator may require Thunder Basin Coal Company to propose modification to their *Dispatch Air Quality Event Action Plan* based on the action plan demonstration.

25. That Thunder Basin Coal Company shall document the measures taken when an action level is triggered in their *Dispatch Air Quality Event Action Plan* in Condition 23.

26. That Thunder Basin Coal Company shall maintain a meteorological station at the Black Thunder Mine acceptable to the Division. Surface air meteorological data measurements shall be collected at the Black Thunder Mine, as specified in the EPA document: Meteorological Monitoring Guidance for Regulatory Modeling Applications. The meteorological data measurements shall consist of hourly observations of:

    a. Wind speed using an anemometer height of 10 meters
    b. Wind direction
    c. Ambient temperature
    d. Vertical temperature difference (delta-temperature) between 2 meters and 10 meters

27. The meteorological data specified in Condition 26 shall be submitted in an electronic format on a quarterly basis.

28. Thunder Basin Coal Company shall install instrumentation to measure the vertical temperature difference as required in Condition 26(d) within sixty (60) days of permit issuance.

29. That Thunder Basin Coal Company will limit public access to the lands defined by the Administrator as necessary to conduct mining operations. Limiting public access will include posting of fences with signs posted at one quarter mile intervals identifying the enclosed area and prohibiting access, locked gates and security at all mine entrances. The signs will identify the mine operator and inform the public of the restricted area. The Administrator has determined that the Lands Necessary to Conduct Mining boundary is described on a map titled *Black Thunder Mine Pit Progression* which is shown in Figure 4-1.

30. The maximum coal production by year at the Black Thunder Mine shall not exceed a production rate of 190 million tons per year. Mining may continue through the year 2024 as described in the mine plan contained in the application for this permit.

31. Thunder Basin Coal Company shall follow the requirements of AP-10900 for the baghouses, boilers, heaters, and stationary diesel fired engines at the Black Thunder Mine.

32. Thunder Basin Coal Company shall retain, at the Black Thunder Mine, records of the daily inspections, monthly observations, PM records, Method 22 observations, and support information as required by this permit for a period of at least five (5) years from the date such records are generated and the records shall be made available to the Division upon request.

33. That this permit shall supersede all previous Chapter 6, Section 2 permits and waivers issued for the Black Thunder Mine and Jacobs Ranch Mine except for permit AP-10900. All conditions of AP-10900 shall remain in effect unless superseded by a specific condition of this permit.

Appendix A

Dispatch Air Quality Event Action Plan

Dispatch Air Quality Event Action Plan
Black Thunder Mine

The Action Levels are programmed automatically into the system. The mine dispatcher monitors the system when the mine is in operation. The system will pop-up an alert when one of the Action Levels has been triggered on any of the continuous Dust Monitors.

Action Levels (short-term 1 hour average)
300 ug/m3 level – notify Production Supervisor

- Supervisor Actions:
  - Notify Production Superintendent
  - Ensure adequate water trucks operating
  - Ensure problem areas are addressed
  - Record water usage and activities for the shift*

Action Levels (Average from Midnight**)
150 ug/m3 level – notify Production Supervisor

- Supervisor Actions:
  - Upon notification, the operations supervisor will consider relevant information, which can include time of day, wind speed, wind direction, and/or the near-term forecast for precipitation and wind activity
  - Notify Production Superintendent, who will notify the Mine Manager if it appears an excursion of the full-day 24-hour average of 150 ug/m3 may occur.
  - Determine areas of mining activity that are generating visible dust
  - Direct water trucks to those areas where access is feasible
  - Prioritize efforts at locations nearest to the mine boundary
  - Ensure adequate water trucks are operating
  - Ensure problem areas are addressed
  - Note any offsite or non-mine activities that may be contributing
  - Inspect topsoil removal and reclamation contractors to ensure proper dust control
  - If it is precipitating in the field, notify dispatch of conditions and continue to monitor levels and field conditions. (The monitor may read false highs until precipitation conditions change.)
  - In areas where water truck access is not feasible, relocate, modify or shut down mining activities contributing dust in the area nearest the triggered monitor if necessary to stabilize dust concentrations. The immediate focus should be on those activities that generate fine soil particles. These activities include:
    - Spoil ripping
    - Topsoil chiseling
    - Topsoil laydown
    - Road maintenance/grading
    - Haul truck traffic
    - Truck dumping of waste coal
    - Truck dumping of product coal
    - Truck dumps of overburden and/or topsoil

  - The secondary focus should be on those activities that generate large soil particles. These activities include:
    - Spoil dozing
    - Dragline operations in the south pit if the spoil peaks are insufficient to contain the dust
    - Other dragline operations
    - If feasible, modify dragline operations to dump the spoils as low as possible in high wind conditions.

Notes:
*TBCC maintains records of water truck hours that are used to generally describe mitigation activities when recorded dust levels are high. These records combined with precipitation information provide an appropriate overview of response activities.

** The 24-hour average from midnight only includes hourly averages from midnight the previous night. It is not a 24-hour rolling average that is utilized by other mines for their action levels; therefore, comparison of action levels between mines is not appropriate. It is possible that the 24-hour average from midnight could contain data from only a few hours in the morning and show average levels over 150 ug/m3 that will lower throughout the day and will not result in an elevated level at the end of the day. This is why it is important for the supervisor to consider time of day when alert levels are triggered.

*** The plan is utilized in addition to normal watering and dust control practices.

Appendix B

PM_{10} Emission Inventory
Model Year 2014

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine: Black Thunder
Inventory Year: 2014
Coal Production (MMTPY): 190

Basis: AP-10986
Date: November 23, 2010
Engineer: Andrew Keyfauver

SCRAPER OPERATIONS

Emission Factor	32 lb/hr
Number of Wet Days	100
Control Factor (%)	50
Control Method	Water
Scraper Hours/Year	33217
PM-10 Emissions (tpy)	**57.88**
PM-10 Emissions (g/s)	**1.67**

OVERBURDEN REMOVAL

Percent Suspended (%)	75
Overburden Density	1.74 ton/bcy
Emission Factor - T/S	0.02 lb/ton
Overburden Removed by T/S	422.358 MMbcy
PM-10 Emissions (tpy)	**1653.53**
PM-10 Emissions (g/s)	**47.57**
Emission Factor - Dragline	0.04 lb/bcy
Overburden Removed by Dragline	196.38 MMbcy
PM-10 Emissions (tpy)	**883.71**
PM-10 Emissions (g/s)	**25.42**

COAL REMOVAL

Emission Factor	0.003 lb/ton
Percent Suspended (%)	70
Coal Removed	190 MMtpy
PM-10 Emissions (tpy)	**59.85**
PM-10 Emissions (g/s)	**1.72**

TRUCK DUMP

Emission Factor	0.017 lb/ton
Control Factor (%)	85
Control Method	Stilling Shed
Percent Suspended (%)	75
Coal Production Rate	190 MMtpy
PM-10 Emissions (tpy)	**54.51**
PM-10 Emissions (g/s)	**1.57**

WIND EROSION

Emission Factor	0.25 ton/acre/yr
Emission Factor	0.05 ton/acre/yr
Disturbed Area	9811 acres
Treated Disturbed Area	0 acres
PM-10 Emissions (tpy)	**735.83**
PM-10 Emissions (g/s)	**21.17**

OVERBURDEN HAUL ROADS

Emission Factor	1.960 lb/VMT
Number of Wet Days	100
Truck Capacity	240 tons
Truck Speed	15 mph
Road Surface Silt Content	8.6
Tire Correction Factor	2.5
Percent Suspended (%)	62
Control Factor (%)	60
Control Method	Water/Chemicals
Overburden Density	1.74 ton/bcy

Pit #1

Overburden Hauled	422.358 MMbcy
Vehicle Miles Traveled	5885938 VMT
Annual Haul Distance	1.92 miles
PM-10 Emissions (tpy)	**692.11**
PM-10 Emissions (g/s)	**19.91**

Pit #2

Overburden Hauled	0 MMbcy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #3

Overburden Hauled	0 MMbcy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #4

Overburden Hauled	0 MMbcy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #5

Overburden Hauled	0 MMbcy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	Black Thunder	Basis:	AP-10986
Inventory Year:	2014	Date:	November 23, 2010
Coal Production (MMTPY):	190	Engineer:	Andrew Keyfauver

COAL HAUL ROADS

Emission Factor	3.484	lb/VMT
Number of Wet Days	100	
Truck Capacity	240	tons
Truck Speed	20	mph
Road Surface Silt Content	8.6	
Tire Correction Factor	2.5	
Percent Suspended (%)	62	
Control Factor (%)	60	
Control Method	Water/Chemicals	

Pit #1

Coal Hauled	190	MMtpy
Vehicle Miles Traveled	3679725	VMT
Annual Haul Distance	4.65	miles
PM-10 Emissions (tpy)	**769.22**	
PM-10 Emissions (g/s)	**22.13**	

Pit #2

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #3

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #4

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #5

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

HAUL ROAD REPAIR

Emission Factor	32	lb/hr
Number of Wet Days	100	
Control Factor (%)	50	
Control Method	Water	
Grader Hours/Year	173761	
PM-10 Emissions (tpy)	**302.77**	
PM-10 Emissions (g/s)	**8.71**	

COAL BLASTING

Emission Factor	35	lb/blast
Percent Suspended (%)	75	
Number of Coal Blasts	1357	
PM-10 Emissions (tpy)	**5.34**	
PM-10 Emissions (g/s)	**0.15**	

OVERBURDEN BLASTING

Emission Factor	50	lb/blast
Percent Suspended (%)	75	
Number of Overburden Blasts	324	
PM-10 Emissions (tpy)	**1.82**	
PM-10 Emissions (g/s)	**0.05**	

WATERTRUCK

Emission Factor	0.26	lb/VMT
Vehicle Miles Traveled	947787	VMT
PM-10 Emissions (tpy)	**61.61**	
PM-10 Emissions (g/s)	**1.77**	

DOZERS

Emission Factor	8	lb/hr
C = ((365-W)/365)	0.726	
Dozer Hours Per Year	413840	
PM-10 Emissions (tpy)	**360.54**	
PM-10 Emissions (g/s)	**10.37**	

TOTAL

Total PM-10 Emissions (tpy)	**5638.72**
Total PM-10 Emissions (g/s)	**162.21**

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	School Creek	Basis:	CT-6445
Inventory Year:	2014	Date:	November 23, 2010
Coal Production (MMTPY):	40	Engineer:	Andrew Keyfauver

SCRAPER OPERATIONS

Emission Factor	32	lb/hr
Number of Wet Days	100	
Control Factor (%)	50	
Control Method	Water	
Scraper Hours/Year	9229	
PM-10 Emissions (tpy)	**16.08**	
PM-10 Emissions (g/s)	**0.46**	

OVERBURDEN REMOVAL

Percent Suspended (%)	75	
Overburden Density	1.74	ton/bcy
Emission Factor - T/S	0.02	lb/ton
Overburden Removed by T/S	70.5678	MMbcy
PM-10 Emissions (tpy)	**276.27**	
PM-10 Emissions (g/s)	**7.95**	
Emission Factor - Dragline	0.04	lb/bcy
Overburden Removed by Dragline	36	MMbcy
PM-10 Emissions (tpy)	**162.00**	
PM-10 Emissions (g/s)	**4.66**	

COAL REMOVAL

Emission Factor	0.003	lb/ton
Percent Suspended (%)	70	
Coal Removed	40	MMtpy
PM-10 Emissions (tpy)	**12.60**	
PM-10 Emissions (g/s)	**0.36**	

TRUCK DUMP

Emission Factor	0.017	lb/ton
Control Factor (%)	85	
Control Method	Stilling Shed	
Percent Suspended (%)	75	
Coal Production Rate	40	MMtpy
PM-10 Emissions (tpy)	**11.48**	
PM-10 Emissions (g/s)	**0.33**	

WIND EROSION

Emission Factor	0.25	ton/acre/yr
Emission Factor	0.05	ton/acre/yr
Disturbed Area	3178	acres
Treated Disturbed Area	1362	acres
PM-10 Emissions (tpy)	**258.78**	
PM-10 Emissions (g/s)	**7.44**	

OVERBURDEN HAUL ROADS

Emission Factor	1.960	lb/VMT
Number of Wet Days	100	
Truck Capacity	240	tons
Truck Speed	15	mph
Road Surface Silt Content	8.6	
Tire Correction Factor	2.5	
Percent Suspended (%)	62	
Control Factor (%)	60	
Control Method	Water/Chemicals	
Overburden Density	1.74	ton/bcy

Pit #1

Overburden Hauled	70.5678	MMbcy
Vehicle Miles Traveled	499300	VMT
Annual Haul Distance	0.98	miles
PM-10 Emissions (tpy)	**58.71**	
PM-10 Emissions (g/s)	**1.69**	

Pit #2

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #3

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #4

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #5

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	School Creek	Basis:	CT-6445
Inventory Year:	2014	Date:	November 23, 2010
Coal Production (MMTPY):	40	Engineer:	Andrew Keyfauver

COAL HAUL ROADS

Emission Factor	3.484	lb/VMT
Number of Wet Days	100	
Truck Capacity	240	tons
Truck Speed	20	mph
Road Surface Silt Content	8.6	
Tire Correction Factor	2.5	
Percent Suspended (%)	62	
Control Factor (%)	60	
Control Method	Water/Chemicals	

Pit #1

Coal Hauled	40	MMtpy
Vehicle Miles Traveled	563447	VMT
Annual Haul Distance	3.38	miles
PM-10 Emissions (tpy)	**117.79**	
PM-10 Emissions (g/s)	**3.39**	

Pit #2

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #3

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #4

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #5

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

HAUL ROAD REPAIR

Emission Factor	32	lb/hr
Number of Wet Days	100	
Control Factor (%)	50	
Control Method	Water	
Grader Hours/Year	21880	
PM-10 Emissions (tpy)	**38.13**	
PM-10 Emissions (g/s)	**1.10**	

COAL BLASTING

Emission Factor	35	lb/blast
Percent Suspended (%)	75	
Number of Coal Blasts	267	
PM-10 Emissions (tpy)	**1.05**	
PM-10 Emissions (g/s)	**0.03**	

OVERBURDEN BLASTING

Emission Factor	50	lb/blast
Percent Suspended (%)	75	
Number of Overburden Blasts	471	
PM-10 Emissions (tpy)	**2.65**	
PM-10 Emissions (g/s)	**0.08**	

WATERTRUCK

Emission Factor	0.26	lb/VMT
Vehicle Miles Traveled	48266	VMT
PM-10 Emissions (tpy)	**3.14**	
PM-10 Emissions (g/s)	**0.09**	

DOZERS on OB

Emission Factor	0.547	lb/hr
C = ((365-W)/365)	0.726	
Dozer Hours Per Year	58984	
PM-10 Emissions (tpy)	**16.13**	
PM-10 Emissions (g/s)	**0.46**	

DOZERS on COAL

Emission Factor	9.626	lb/hr
C = ((365-W)/365)	0.726	
Dozer Hours Per Year	8955	
PM-10 Emissions (tpy)	**43.10**	
PM-10 Emissions (g/s)	**1.24**	

TOTAL

Total PM-10 Emissions (tpy)	**1017.90**
Total PM-10 Emissions (g/s)	**28.04**

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	North Antelope Rochelle	Basis:	MD-6375
Inventory Year:	2014	Date:	November 23, 2010
Coal Production (MMTPY):	135	Engineer:	Andrew Keyfauver

SCRAPER OPERATIONS

Emission Factor	32	lb/hr
Number of Wet Days	100	
Control Factor (%)	50	
Control Method	Water	
Scraper Hours/Year	21886	
PM-10 Emissions (tpy)	**38.14**	
PM-10 Emissions (g/s)	**1.10**	

OVERBURDEN REMOVAL

Percent Suspended (%)	75	
Overburden Density	1.74	ton/bcy
Emission Factor - T/S	0.02	lb/ton
Overburden Removed by T/S	130.877	MMbcy
PM-10 Emissions (tpy)	**512.38**	
PM-10 Emissions (g/s)	**14.74**	
Emission Factor - Dragline	0.04	lb/bcy
Overburden Removed by Dragline	111.803	MMbcy
PM-10 Emissions (tpy)	**503.11**	
PM-10 Emissions (g/s)	**14.47**	

COAL REMOVAL

Emission Factor	0.003	lb/ton
Percent Suspended (%)	70	
Coal Removed	135	MMtpy
PM-10 Emissions (tpy)	**42.53**	
PM-10 Emissions (g/s)	**1.22**	

TRUCK DUMP

Emission Factor	0.017	lb/ton
Control Factor (%)	85	
Control Method	Stilling Shed	
Percent Suspended (%)	75	
Coal Production Rate	135	MMtpy
PM-10 Emissions (tpy)	**38.73**	
PM-10 Emissions (g/s)	**1.11**	

WIND EROSION

Emission Factor	0.25	ton/acre/yr
Emission Factor	0.05	ton/acre/yr
Disturbed Area	4360	acres
Treated Disturbed Area	1868	acres
PM-10 Emissions (tpy)	**355.02**	
PM-10 Emissions (g/s)	**10.21**	

OVERBURDEN HAUL ROADS

Emission Factor	1.960	lb/VMT
Number of Wet Days	100	
Truck Capacity	240	tons
Truck Speed	15	mph
Road Surface Silt Content	8.6	
Tire Correction Factor	2.5	
Percent Suspended (%)	62	
Control Factor (%)	60	
Control Method	Water/Chemicals	
Overburden Density	1.74	ton/bcy

Pit #1

Overburden Hauled	130.877	MMbcy
Vehicle Miles Traveled	2514105	VMT
Annual Haul Distance	2.65	miles
PM-10 Emissions (tpy)	**295.63**	
PM-10 Emissions (g/s)	**8.50**	

Pit #2

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #3

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #4

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #5

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	North Antelope Rochelle	Basis:	MD-6375
Inventory Year:	2014	Date:	November 23, 2010
Coal Production (MMTPY):	135	Engineer:	Andrew Keyfauver

COAL HAUL ROADS

Emission Factor	3.484	lb/VMT
Number of Wet Days	100	
Truck Capacity	240	tons
Truck Speed	20	mph
Road Surface Silt Content	8.6	
Tire Correction Factor	2.5	
Percent Suspended (%)	62	
Control Factor (%)	60	
Control Method	Water/Chemicals	

Pit #1

Coal Hauled	135	MMtpy
Vehicle Miles Traveled	2871798	VMT
Annual Haul Distance	5.11	miles
PM-10 Emissions (tpy)	**600.33**	
PM-10 Emissions (g/s)	**17.27**	

Pit #2

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #3

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #4

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #5

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

HAUL ROAD REPAIR

Emission Factor	32	lb/hr
Number of Wet Days	100	
Control Factor (%)	50	
Control Method	Water	
Grader Hours/Year	66035	
PM-10 Emissions (tpy)	**115.06**	
PM-10 Emissions (g/s)	**3.31**	

COAL BLASTING

Emission Factor	35	lb/blast
Percent Suspended (%)	75	
Number of Coal Blasts	900	
PM-10 Emissions (tpy)	**3.54**	
PM-10 Emissions (g/s)	**0.10**	

OVERBURDEN BLASTING

Emission Factor	50	lb/blast
Percent Suspended (%)	75	
Number of Overburden Blasts	523	
PM-10 Emissions (tpy)	**2.94**	
PM-10 Emissions (g/s)	**0.08**	

WATERTRUCK

Emission Factor	0.26	lb/VMT
Vehicle Miles Traveled	341538	VMT
PM-10 Emissions (tpy)	**17.76**	
PM-10 Emissions (g/s)	**0.51**	

DOZERS on OB

Emission Factor	0.547	lb/hr
C = ((365-W)/365)	0.726	
Dozer Hours Per Year	176206	
PM 10 Emissions (tpy)	**48.19**	
PM 10 Emissions (g/s)	**1.39**	

DOZERS on COAL

Emission Factor	9.626	lb/hr
C = ((365-W)/365)	0.726	
Dozer Hours Per Year	30223	
PM-10 Emissions (tpy)	**145.46**	
PM-10 Emissions (g/s)	**4.18**	

TOTAL

Total PM-10 Emissions (tpy)	**2718.83**
Total PM-10 Emissions (g/s)	**74.03**

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	Antelope	Basis:	MD-1543
Inventory Year:	2014	Date:	November 23, 2010
Coal Production (MMTPY):	42	Engineer:	Andrew Keyfauver

SCRAPER OPERATIONS

Emission Factor	32	lb/hr
Number of Wet Days	100	
Control Factor (%)	50	
Control Method	Water	
Scraper Hours/Year	14843	
PM-10 Emissions (tpy)	**25.86**	
PM-10 Emissions (g/s)	**0.74**	

OVERBURDEN REMOVAL

Percent Suspended (%)	75	
Overburden Density	1.74	ton/bcy
Emission Factor - T/S	0.02	lb/ton
Overburden Removed by T/S	94.9198	MMbcy
PM-10 Emissions (tpy)	**371.61**	
PM-10 Emissions (g/s)	**10.69**	
Emission Factor - Dragline	0.04	lb/bcy
Overburden Removed by Dragline	16.6272	MMbcy
PM-10 Emissions (tpy)	**74.82**	
PM-10 Emissions (g/s)	**2.15**	

COAL REMOVAL

Emission Factor	0.003	lb/ton
Percent Suspended (%)	70	
Coal Removed	42	MMtpy
PM-10 Emissions (tpy)	**13.23**	
PM-10 Emissions (g/s)	**0.38**	

TRUCK DUMP

Emission Factor	0.017	lb/ton
Control Factor (%)	85	
Control Method	Stilling Shed	
Percent Suspended (%)	75	
Coal Production Rate	42	MMtpy
PM-10 Emissions (tpy)	**12.05**	
PM-10 Emissions (g/s)	**0.35**	

WIND EROSION

Emission Factor	0.25	ton/acre/yr
Emission Factor	0.05	ton/acre/yr
Disturbed Area	358	acres
Treated Disturbed Area	0	acres
PM-10 Emissions (tpy)	**26.85**	
PM-10 Emissions (g/s)	**0.77**	

OVERBURDEN HAUL ROADS

Emission Factor	1.960	lb/VMT
Number of Wet Days	100	
Truck Capacity	240	tons
Truck Speed	15	mph
Road Surface Silt Content	8.6	
Tire Correction Factor	2.5	
Percent Suspended (%)	62	
Control Factor (%)	60	
Control Method	Water/Chemicals	
Overburden Density	1.74	ton/bcy

Pit #1

Overburden Hauled	94.9198	MMbcy
Vehicle Miles Traveled	1003268	VMT
Annual Haul Distance	1.46	miles
PM-10 Emissions (tpy)	**117.97**	
PM-10 Emissions (g/s)	**3.39**	

Pit #2

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #3

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #4

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #5

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	Antelope	Basis:	MD-1543
Inventory Year:	2014	Date:	November 23, 2010
Coal Production (MMTPY):	42	Engineer:	Andrew Keyfauver

COAL HAUL ROADS

Emission Factor	3.484	lb/VMT
Number of Wet Days	100	
Truck Capacity	240	tons
Truck Speed	20	mph
Road Surface Silt Content	8.6	
Tire Correction Factor	2.5	
Percent Suspended (%)	62	
Control Factor (%)	60	
Control Method	Water/Chemicals	

Pit #1

Coal Hauled	42	MMtpy
Vehicle Miles Traveled	810244	VMT
Annual Haul Distance	4.63	miles
PM-10 Emissions (tpy)	**169.38**	
PM-10 Emissions (g/s)	**4.87**	

Pit #2

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #3

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #4

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #5

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

HAUL ROAD REPAIR

Emission Factor	32	lb/hr
Number of Wet Days	100	
Control Factor (%)	50	
Control Method	Water	
Grader Hours/Year	45399	
PM-10 Emissions (tpy)	**79.11**	
PM-10 Emissions (g/s)	**2.28**	

COAL BLASTING

Emission Factor	35	lb/blast
Percent Suspended (%)	75	
Number of Coal Blasts	482	
PM-10 Emissions (tpy)	**1.90**	
PM-10 Emissions (g/s)	**0.05**	

OVERBURDEN BLASTING

Emission Factor	50	lb/blast
Percent Suspended (%)	75	
Number of Overburden Blasts	515	
PM-10 Emissions (tpy)	**2.90**	
PM-10 Emissions (g/s)	**0.08**	

WATERTRUCK

Emission Factor	0.59	lb/VMT
Vehicle Miles Traveled	422401	VMT
PM-10 Emissions (tpy)	**49.67**	
PM-10 Emissions (g/s)	**1.43**	

DOZERS on OB

Emission Factor	0.547	lb/hr
C = ((365-W)/365)	0.726	
Dozer Hours Per Year	35775	
PM-10 Emissions (tpy)	**9.78**	
PM-10 Emissions (g/s)	**0.28**	

DOZERS on COAL

Emission Factor	9.626	lb/hr
C = ((365-W)/365)	0.726	
Dozer Hours Per Year	44416	
PM-10 Emissions (tpy)	**213.77**	
PM-10 Emissions (g/s)	**6.15**	

TOTAL

Total PM-10 Emissions (tpy)	**1168.91**
Total PM-10 Emissions (g/s)	**17.48**

Appendix C

PM_{10} Emission Inventory
Model Year 2015

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	Black Thunder	Basis:	AP-10986
Inventory Year:	2015	Date:	November 23, 2010
Coal Production (MMTPY):	190	Engineer:	Andrew Keyfauver

SCRAPER OPERATIONS

Emission Factor	32	lb/hr
Number of Wet Days	100	
Control Factor (%)	50	
Control Method	Water	
Scraper Hours/Year	33218	
PM-10 Emissions (tpy)	**57.88**	
PM-10 Emissions (g/s)	**1.67**	

OVERBURDEN REMOVAL

Percent Suspended (%)	75	
Overburden Density	1.74	ton/bcy
Emission Factor - T/S	0.02	lb/ton
Overburden Removed by T/S	428.554	MMbcy
PM-10 Emissions (tpy)	**1677.79**	
PM-10 Emissions (g/s)	**48.27**	
Emission Factor - Dragline	0.04	lb/bcy
Overburden Removed by Dragline	198.85	MMbcy
PM-10 Emissions (tpy)	**894.83**	
PM-10 Emissions (g/s)	**25.74**	

COAL REMOVAL

Emission Factor	0.003	lb/ton
Percent Suspended (%)	70	
Coal Removed	190	MMtpy
PM-10 Emissions (tpy)	**59.85**	
PM-10 Emissions (g/s)	**1.72**	

TRUCK DUMP

Emission Factor	0.017	lb/ton
Control Factor (%)	85	
Control Method	Stilling Shed	
Percent Suspended (%)	75	
Coal Production Rate	190	MMtpy
PM-10 Emissions (tpy)	**54.51**	
PM-10 Emissions (g/s)	**1.57**	

WIND EROSION

Emission Factor	0.25	ton/acre/yr
Emission Factor	0.05	ton/acre/yr
Disturbed Area	9082	acres
Treated Disturbed Area	0	acres
PM-10 Emissions (tpy)	**681.15**	
PM-10 Emissions (g/s)	**19.59**	

OVERBURDEN HAUL ROADS

Emission Factor	1.960	lb/VMT
Number of Wet Days	100	
Truck Capacity	240	tons
Truck Speed	15	mph
Road Surface Silt Content	8.6	
Tire Correction Factor	2.5	
Percent Suspended (%)	62	
Control Factor (%)	60	
Control Method	Water/Chemicals	
Overburden Density	1.74	ton/bcy

Pit #1

Overburden Hauled	428.554	MMbcy
Vehicle Miles Traveled	5990962	VMT
Annual Haul Distance	1.93	miles
PM-10 Emissions (tpy)	**704.46**	
PM-10 Emissions (g/s)	**20.27**	

Pit #2

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #3

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #4

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #5

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	Black Thunder	Basis:	AP-10986
Inventory Year:	2015	Date:	November 23, 2010
Coal Production (MMTPY):	190	Engineer:	Andrew Keyfauver

COAL HAUL ROADS

Emission Factor	3.484	lb/VMT
Number of Wet Days	100	
Truck Capacity	240	tons
Truck Speed	20	mph
Road Surface Silt Content	8.6	
Tire Correction Factor	2.5	
Percent Suspended (%)	62	
Control Factor (%)	60	
Control Method	Water/Chemicals	

Pit #1

Coal Hauled	190	MMtpy
Vehicle Miles Traveled	3903329	VMT
Annual Haul Distance	4.93	miles
PM-10 Emissions (tpy)	**815.97**	
PM-10 Emissions (g/s)	**23.47**	

Pit #2

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #3

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #4

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #5

Coal Hauled	0	MMtpy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

HAUL ROAD REPAIR

Emission Factor	32	lb/hr
Number of Wet Days	100	
Control Factor (%)	50	
Control Method	Water	
Grader Hours/Year	175465	
PM-10 Emissions (tpy)	**305.74**	
PM-10 Emissions (g/s)	**8.80**	

COAL BLASTING

Emission Factor	35	lb/blast
Percent Suspended (%)	75	
Number of Coal Blasts	1357	
PM-10 Emissions (tpy)	**5.34**	
PM-10 Emissions (g/s)	**0.15**	

OVERBURDEN BLASTING

Emission Factor	50	lb/blast
Percent Suspended (%)	75	
Number of Overburden Blasts	335	
PM-10 Emissions (tpy)	**1.88**	
PM-10 Emissions (g/s)	**0.05**	

WATERTRUCK

Emission Factor	0.26	lb/VMT
Vehicle Miles Traveled	957081	VMT
PM-10 Emissions (tpy)	**62.21**	
PM-10 Emissions (g/s)	**1.79**	

DOZERS

Emission Factor	8	lb/hr
C = ((365-W)/365)	0.726	
Dozer Hours Per Year	419034	
PM-10 Emissions (tpy)	**365.06**	
PM-10 Emissions (g/s)	**10.50**	

TOTAL

Total PM-10 Emissions (tpy)	**5686.67**
Total PM-10 Emissions (g/s)	**163.59**

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	School Creek	Basis:	CT-6445
Inventory Year:	2015	Date:	November 23, 2010
Coal Production (MMTPY):	40	Engineer:	Andrew Keyfauver

SCRAPER OPERATIONS

Emission Factor	32	lb/hr
Number of Wet Days	100	
Control Factor (%)	50	
Control Method	Water	
Scraper Hours/Year	9228	
PM-10 Emissions (tpy)	**16.08**	
PM-10 Emissions (g/s)	**0.46**	

OVERBURDEN REMOVAL

Percent Suspended (%)	75	
Overburden Density	1.74	ton/bcy
Emission Factor - T/S	0.02	lb/ton
Overburden Removed by T/S	64.8466	MMbcy
PM-10 Emissions (tpy)	**253.87**	
PM-10 Emissions (g/s)	**7.30**	
Emission Factor - Dragline	0.04	lb/bcy
Overburden Removed by Dragline	42.5514	MMbcy
PM-10 Emissions (tpy)	**191.48**	
PM-10 Emissions (g/s)	**5.51**	

COAL REMOVAL

Emission Factor	0.003	lb/ton
Percent Suspended (%)	70	
Coal Removed	40	MMtpy
PM-10 Emissions (tpy)	**12.60**	
PM-10 Emissions (g/s)	**0.36**	

TRUCK DUMP

Emission Factor	0.017	lb/ton
Control Factor (%)	85	
Control Method	Stilling Shed	
Percent Suspended (%)	75	
Coal Production Rate	40	MMtpy
PM-10 Emissions (tpy)	**11.48**	
PM-10 Emissions (g/s)	**0.33**	

WIND EROSION

Emission Factor	0.25	ton/acre/yr
Emission Factor	0.05	ton/acre/yr
Disturbed Area	3426	acres
Treated Disturbed Area	1468	acres
PM-10 Emissions (tpy)	**278.97**	
PM-10 Emissions (g/s)	**8.03**	

OVERBURDEN HAUL ROADS

Emission Factor	1.960	lb/VMT
Number of Wet Days	100	
Truck Capacity	240	tons
Truck Speed	15	mph
Road Surface Silt Content	8.6	
Tire Correction Factor	2.5	
Percent Suspended (%)	62	
Control Factor (%)	60	
Control Method	Water/Chemicals	
Overburden Density	1.74	ton/bcy

Pit #1

Overburden Hauled	64.8466	MMbcy
Vehicle Miles Traveled	588376	VMT
Annual Haul Distance	1.25	miles
PM-10 Emissions (tpy)	**69.19**	
PM-10 Emissions (g/s)	**1.99**	

Pit #2

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #3

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #4

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #5

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	School Creek	Basis:	CT-6445
Inventory Year:	2015	Date:	November 23, 2010
Coal Production (MMTPY):	40	Engineer:	Andrew Keyfauver

COAL HAUL ROADS

Emission Factor	3.484 lb/VMT
Number of Wet Days	100
Truck Capacity	240 tons
Truck Speed	20 mph
Road Surface Silt Content	8.6
Tire Correction Factor	2.5
Percent Suspended (%)	62
Control Factor (%)	60
Control Method	Water/Chemicals

Pit #1

Coal Hauled	40 MMtpy
Vehicle Miles Traveled	539044 VMT
Annual Haul Distance	3.23 miles
PM-10 Emissions (tpy)	**112.68**
PM-10 Emissions (g/s)	**3.24**

Pit #2

Coal Hauled	0 MMtpy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #3

Coal Hauled	0 MMtpy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #4

Coal Hauled	0 MMtpy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #5

Coal Hauled	0 MMtpy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

HAUL ROAD REPAIR

Emission Factor	32 lb/hr
Number of Wet Days	100
Control Factor (%)	50
Control Method	Water
Grader Hours/Year	21880
PM-10 Emissions (tpy)	**38.13**
PM-10 Emissions (g/s)	**1.10**

COAL BLASTING

Emission Factor	35 lb/blast
Percent Suspended (%)	75
Number of Coal Blasts	266
PM-10 Emissions (tpy)	**1.05**
PM-10 Emissions (g/s)	**0.03**

OVERBURDEN BLASTING

Emission Factor	50 lb/blast
Percent Suspended (%)	75
Number of Overburden Blasts	432
PM-10 Emissions (tpy)	**2.43**
PM-10 Emissions (g/s)	**0.07**

WATERTRUCK

Emission Factor	0.26 lb/VMT
Vehicle Miles Traveled	48266 VMT
PM-10 Emissions (tpy)	**3.14**
PM-10 Emissions (g/s)	**0.09**

DOZERS on OB

Emission Factor	0.547 lb/hr
C = ((365-W)/365)	0.726
Dozer Hours Per Year	60855
PM-10 Emissions (tpy)	**16.64**
PM-10 Emissions (g/s)	**0.48**

DOZERS on COAL

Emission Factor	9.626 lb/hr
C = ((365-W)/365)	0.726
Dozer Hours Per Year	8956
PM-10 Emissions (tpy)	**43.11**
PM-10 Emissions (g/s)	**1.24**

TOTAL

Total PM-10 Emissions (tpy)	**1050.84**
Total PM-10 Emissions (g/s)	**28.99**

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	North Antelope Rochelle	Basis:	MD-6375
Inventory Year:	2015	Date:	November 23, 2010
Coal Production (MMTPY):	140	Engineer:	Andrew Keyfauver

SCRAPER OPERATIONS

Emission Factor	32	lb/hr
Number of Wet Days	100	
Control Factor (%)	50	
Control Method	Water	
Scraper Hours/Year	23687	
PM-10 Emissions (tpy)	**41.27**	
PM-10 Emissions (g/s)	**1.19**	

OVERBURDEN REMOVAL

Percent Suspended (%)	75	
Overburden Density	1.74	ton/bcy
Emission Factor - T/S	0.02	lb/ton
Overburden Removed by T/S	87.1706	MMbcy
PM-10 Emissions (tpy)	**341.27**	
PM-10 Emissions (g/s)	**9.82**	
Emission Factor - Dragline	0.04	lb/bcy
Overburden Removed by Dragline	107.094	MMbcy
PM-10 Emissions (tpy)	**481.92**	
PM-10 Emissions (g/s)	**13.86**	

COAL REMOVAL

Emission Factor	0.003	lb/ton
Percent Suspended (%)	70	
Coal Removed	140	MMtpy
PM-10 Emissions (tpy)	**44.10**	
PM-10 Emissions (g/s)	**1.27**	

TRUCK DUMP

Emission Factor	0.017	lb/ton
Control Factor (%)	85	
Control Method	Stilling Shed	
Percent Suspended (%)	75	
Coal Production Rate	140	MMtpy
PM-10 Emissions (tpy)	**40.16**	
PM-10 Emissions (g/s)	**1.16**	

WIND EROSION

Emission Factor	0.25	ton/acre/yr
Emission Factor	0.05	ton/acre/yr
Disturbed Area	4381	acres
Treated Disturbed Area	1877	acres
PM-10 Emissions (tpy)	**356.73**	
PM-10 Emissions (g/s)	**10.26**	

OVERBURDEN HAUL ROADS

Emission Factor	1.960	lb/VMT
Number of Wet Days	100	
Truck Capacity	240	tons
Truck Speed	15	mph
Road Surface Silt Content	8.6	
Tire Correction Factor	2.5	
Percent Suspended (%)	62	
Control Factor (%)	60	
Control Method	Water/Chemicals	
Overburden Density	1.74	ton/bcy

Pit #1

Overburden Hauled	87.1706	MMbcy
Vehicle Miles Traveled	1661397	VMT
Annual Haul Distance	2.63	miles
PM-10 Emissions (tpy)	**195.36**	
PM-10 Emissions (g/s)	**5.62**	

Pit #2

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #3

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #4

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

Pit #5

Overburden Hauled	0	MMbcy
Vehicle Miles Traveled	0	VMT
Annual Haul Distance	#DIV/0!	miles
PM-10 Emissions (tpy)	**0.00**	
PM-10 Emissions (g/s)	**0.00**	

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	North Antelope Rochelle	Basis:	MD-6375
Inventory Year:	2015	Date:	November 23, 2010
Coal Production (MMTPY):	140	Engineer:	Andrew Keyfauver

COAL HAUL ROADS

Emission Factor	3.484 lb/VMT
Number of Wet Days	100
Truck Capacity	240 tons
Truck Speed	20 mph
Road Surface Silt Content	8.6
Tire Correction Factor	2.5
Percent Suspended (%)	62
Control Factor (%)	60
Control Method	Water/Chemicals

Pit #1

Coal Hauled	140 MMtpy
Vehicle Miles Traveled	2683276 VMT
Annual Haul Distance	4.60 miles
PM-10 Emissions (tpy)	**560.92**
PM-10 Emissions (g/s)	**16.14**

Pit #2

Coal Hauled	0 MMtpy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM 10 Emissions (g/s)	**0.00**

Pit #3

Coal Hauled	0 MMtpy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #4

Coal Hauled	0 MMtpy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #5

Coal Hauled	0 MMtpy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM 10 Emissions (g/s)	**0.00**

HAUL ROAD REPAIR

Emission Factor	32 lb/hr
Number of Wet Days	100
Control Factor (%)	50
Control Method	Water
Grader Hours/Year	58602
PM-10 Emissions (tpy)	**102.11**
PM-10 Emissions (g/s)	**2.94**

COAL BLASTING

Emission Factor	35 lb/blast
Percent Suspended (%)	75
Number of Coal Blasts	71
PM-10 Emissions (tpy)	**0.28**
PM-10 Emissions (g/s)	**0.01**

OVERBURDEN BLASTING

Emission Factor	50 lb/blast
Percent Suspended (%)	75
Number of Overburden Blasts	349
PM-10 Emissions (tpy)	**1.96**
PM-10 Emissions (g/s)	**0.06**

WATERTRUCK

Emission Factor	0.26 lb/VMT
Vehicle Miles Traveled	301629 VMT
PM-10 Emissions (tpy)	**15.68**
PM-10 Emissions (g/s)	**0.45**

DOZERS on OB

Emission Factor	0.547 lb/hr
C = ((365-W)/365)	0.726
Dozer Hours Per Year	179523
PM-10 Emissions (tpy)	**49.10**
PM-10 Emissions (g/s)	**1.41**

DOZERS on COAL

Emission Factor	9.626 lb/hr
C = ((365-W)/365)	0.726
Dozer Hours Per Year	31342
PM-10 Emissions (tpy)	**150.85**
PM 10 Emissions (g/s)	**4.34**

TOTAL

Total PM-10 Emissions (tpy)	**2381.73**
Total PM-10 Emissions (g/s)	**64.18**

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory
Fugitive PM_{10} Calculation Form

Mine:	Antelope	Basis:	MD-1543
Inventory Year:	2015	Date:	November 23, 2010
Coal Production (MMTPY):	42	Engineer:	Andrew Keyfauver

SCRAPER OPERATIONS

Emission Factor	32 lb/hr
Number of Wet Days	100
Control Factor (%)	50
Control Method	Water
Scraper Hours/Year	14415
PM-10 Emissions (tpy)	**25.12**
PM-10 Emissions (g/s)	**0.72**

OVERBURDEN REMOVAL

Percent Suspended (%)	75
Overburden Density	1.74 ton/bcy
Emission Factor - T/S	0.02 lb/ton
Overburden Removed by T/S	95.5194 MMbcy
PM-10 Emissions (tpy)	**373.96**
PM-10 Emissions (g/s)	**10.76**
Emission Factor - Dragline	0.04 lb/bcy
Overburden Removed by Dragline	0 MMbcy
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

COAL REMOVAL

Emission Factor	0.003 lb/ton
Percent Suspended (%)	70
Coal Removed	42 MMtpy
PM-10 Emissions (tpy)	**13.23**
PM-10 Emissions (g/s)	**0.38**

TRUCK DUMP

Emission Factor	0.017 lb/ton
Control Factor (%)	85
Control Method	Stilling Shed
Percent Suspended (%)	75
Coal Production Rate	42 MMtpy
PM-10 Emissions (tpy)	**12.05**
PM-10 Emissions (g/s)	**0.35**

WIND EROSION

Emission Factor	0.25 ton/acre/yr
Emission Factor	0.05 ton/acre/yr
Disturbed Area	263 acres
Treated Disturbed Area	0 acres
PM-10 Emissions (tpy)	**19.73**
PM-10 Emissions (g/s)	**0.57**

OVERBURDEN HAUL ROADS

Emission Factor	1.960 lb/VMT
Number of Wet Days	100
Truck Capacity	240 tons
Truck Speed	15 mph
Road Surface Silt Content	8.6
Tire Correction Factor	2.5
Percent Suspended (%)	62
Control Factor (%)	60
Control Method	Water/Chemicals
Overburden Density	1.74 ton/bcy

Pit #1

Overburden Hauled	95.5194 MMbcy
Vehicle Miles Traveled	1095084 VMT
Annual Haul Distance	1.58 miles
PM-10 Emissions (tpy)	**128.77**
PM-10 Emissions (g/s)	**3.70**

Pit #2

Overburden Hauled	0 MMbcy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #3

Overburden Hauled	0 MMbcy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #4

Overburden Hauled	0 MMbcy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #5

Overburden Hauled	0 MMbcy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

STATE OF WYOMING

Department of Environmental Quality - Air Quality Division

Coal Mine Emission Inventory

Fugitive PM_{10} Calculation Form

Mine: Antelope
Inventory Year: 2015
Coal Production (MMTPY): 42

Basis: MD-1543
Date: November 23, 2010
Engineer: Andrew Keyfauver

COAL HAUL ROADS

Emission Factor	3.484 lb/VMT
Number of Wet Days	100
Truck Capacity	240 tons
Truck Speed	20 mph
Road Surface Silt Content	8.6
Tire Correction Factor	2.5
Percent Suspended (%)	62
Control Factor (%)	60
Control Method	Water/Chemicals

Pit #1

Coal Hauled	42 MMtpy
Vehicle Miles Traveled	605666 VMT
Annual Haul Distance	3.46 miles
PM-10 Emissions (tpy)	**126.61**
PM-10 Emissions (g/s)	**3.64**

Pit #2

Coal Hauled	0 MMtpy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #3

Coal Hauled	0 MMtpy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #4

Coal Hauled	0 MMtpy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

Pit #5

Coal Hauled	0 MMtpy
Vehicle Miles Traveled	0 VMT
Annual Haul Distance	#DIV/0! miles
PM-10 Emissions (tpy)	**0.00**
PM-10 Emissions (g/s)	**0.00**

HAUL ROAD REPAIR

Emission Factor	32 lb/hr
Number of Wet Days	100
Control Factor (%)	50
Control Method	Water
Grader Hours/Year	44439
PM-10 Emissions (tpy)	**77.43**
PM-10 Emissions (g/s)	**2.23**

COAL BLASTING

Emission Factor	35 lb/blast
Percent Suspended (%)	75
Number of Coal Blasts	333
PM-10 Emissions (tpy)	**1.31**
PM-10 Emissions (g/s)	**0.04**

OVERBURDEN BLASTING

Emission Factor	50 lb/blast
Percent Suspended (%)	75
Number of Overburden Blasts	445
PM-10 Emissions (tpy)	**2.50**
PM-10 Emissions (g/s)	**0.07**

WATERTRUCK

Emission Factor	0.59 lb/VMT
Vehicle Miles Traveled	402894 VMT
PM-10 Emissions (tpy)	**47.38**
PM-10 Emissions (g/s)	**1.36**

DOZERS on OB

Emission Factor	0.547 lb/hr
C = ((365-W)/365)	0.726
Dozer Hours Per Year	17823
PM-10 Emissions (tpy)	**4.87**
PM-10 Emissions (g/s)	**0.14**

DOZERS on COAL

Emission Factor	9.626 lb/hr
C = ((365-W)/365)	0.726
Dozer Hours Per Year	40762
PM-10 Emissions (tpy)	**196.19**
PM-10 Emissions (g/s)	**5.64**

TOTAL	
Total PM-10 Emissions (tpy)	1029.15
Total PM-10 Emissions (g/s)	23.96

Exhibit 12

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

Special Study Topic Oversight Report on Blasting in Wyoming (EY 2013)

Prior to the beginning of each evaluation year and as part of the oversight and outreach process, the Office of Surface Mining Reclamation and Enforcement (OSM) and the Wyoming Department of Environmental Quality (DEQ) Land Quality Division (LQD) solicit input from the public and interested parties regarding potential oversight topics for the upcoming Evaluation Year (EY). As part of EY 2013 oversight and as a result of suggestions and concerns from the public and interested parties, OSM and LQD agreed to evaluate a number of Wyoming coal mine permits regarding current approved blasting plans to determine compliance with the requirements of the Wyoming Coal Rules and Regulations. The topic of blasting was chosen for this evaluation year in response to suggestions and concerns raised by the public and interested parties, and a formal citizen's complaint that OSM received regarding fumes from blasting, specifically oxides of nitrogen (NOx) gas clouds. In addition to reviewing blasting plans to determine compliance with Wyoming Coal Rules and Regulations, it was also agreed that OSM would evaluate LQD's method of checking for permittee compliance with the blast plans in the field. Additionally, OSM and LQD would conduct an outreach/educational stakeholder meeting to discuss and convey current laws, regulations, the science behind blasting, and current procedures—including what to do if a citizen experiences a negative impact (damages/injury) from blasting, or NOx gas. Wyoming Coal Rules and Regulations applicable to blasting are found in Chapter 2, Section 5(a)(vii), and Chapter 6.

Permit Review

The current blasting plans contained in the following permits were evaluated to determine compliance with the requirements of the Wyoming Coal Rules and Regulations:

- Thunder Basin Coal Company's Black Thunder Mine (Permit # 233-T8)
- Peabody's Caballo Mine (Permit # 433-T6)
- Thunder Basin Coal Company's Coal Creek Mine (Permit # 483-T6)
- Cloud Peak Energy's Cordero Rojo Mine (Permit # 237-T8)
- Bridger Coal Company's Jim Bridger Mine (Permit # 338-T6)

The results of the permit review are as follows.

Thunder Basin Coal Company's Black Thunder Mine

Wyoming Coal Rules and Regulations, at Chapter 2, Section 5(a)(vii)(C), require blasting plans include, among other things, the description and location of blasting monitoring, warning and site access control equipment and procedures proposed to be used pursuant to Chapter 6, Section 4.

The Black Thunder Mine Blasting Plan, at MP-3.3.6, states that "Black Thunder does conduct periodic (quarterly) monitoring for compliance with ground-vibration standards (maximum peak particle velocity). Additionally, at MP-3.3.5, the Black Thunder Mine Blasting Plan states that "Peak particle velocities will not exceed the values given in the current LQD Coal Rules and Regulations, Chapter 6, Section 4(b)(iv) at any inhabited structure within one-half mile of the Black Thunder Mine permit

boundary. Other engineered structures will be limited to five inches per second using a modified scale distance factor of 10.02".

Wyoming Coal Rules and Regulations, at Chapter 6, Section 4(b)(iii) (maximum peak particle velocity Vmax table) specifies maximum peak particle velocity limits for inhabited structures located 0 to 300 feet from the blasting site, 301 to 5000 feet from the blasting site, and 5001 and beyond (feet) from the blasting site. Although the Black Thunder Mine Blasting Plan states, at *MP-3.3.3,* that "At this time no inhabited dwellings occur within one-half mile of the permit area", this does not relieve the mine from keeping maximum peak particle velocities with the limits listed above regarding inhabited dwellings *beyond* one-half mile of the permit area. OSM is recommending that LQD work with Thunder Basin Coal to revise the Black Thunder Mine Blasting Plan to reflect this and to also be consistent with the Black Thunder Mine Blasting Plan, at MP-3.3.5, which states, in pertinent part, that "Inhabited structures will remain at the maximum particle velocity given in the previously referenced current LQD Coal Rules and Regulations, Chapter 6, Section 4(b)(iv)".

Additionally, Wyoming Coal Rules and Regulations, at Chapter 2, Section 5(a)(vii)(E), requires that a sample copy of the public notices required by Chapter 6, Section 3 be included in the blasting plan. Although the Black Thunder Mine Blasting Plan does include a section, at MP-3.3.4 (Public Notices of Blasting Activity), which describes the measures to be taken to notify the public regarding blasting activities, the Blasting Plan does not contain a sample copy of the public notices required by the rule stated above. OSM is recommending that LQD work with Thunder Basin Coal to revise the Black Thunder Mine Blasting Plan to include a sample copy of the public notices required by the rule stated above.

OSM found that remaining portions of the Black Thunder Mine Blasting Plan meets or exceeds the requirements of the Wyoming Coal Rules and Regulations at Chapter 2, Section 5(a)(vii) and Chapter 6.

Peabody's Caballo Mine

OSM found that the Caballo Mine Blasting Plan meets or exceeds the requirements of the Wyoming Coal Rules and Regulations at Chapter 2, Section 5(a)(vii) and Chapter 6.

Thunder Basin Coal Company's Coal Creek Mine

Wyoming Coal Rules and Regulations, at Chapter 2, Section 5(a)(vii)(C), require blasting plans include, among other things, the description and location of blasting monitoring, warning and site access control equipment and procedures proposed to be used pursuant to Chapter 6, Section 4.

The Coal Creek Mine Blasting Plan, at MP-3.3.5, states that "Seismograph surveys of each blast are not required at the Coal Creek Mine since there is limited exposure to inhabited structures and other engineered structures. However, seismograph surveys may be conducted when approaching structures

so that scale distance factors can be modified as necessary to meet the previously identified requirements which vary depending upon the type of the structure. Peak particle velocities will not exceed the values given in the current Land Quality Division Rules and Regulations, Chapter 6, Section 4.(b)(iv) at any inhabited structure within one-half mile of the Coal Creek Mine permit boundary using a scale distance factor of 65. Other engineered structures, such as pipelines, wells, highways, railroads, and buried cables will be limited to five inches per second..... Inhabited structures will remain at the maximum particle velocity given in the previously referenced current LQD Coal Rules and Regulations, Chapter 6, Section 4 (b)(iv)".

Wyoming Coal Rules and Regulations, at Chapter 6, Section 4(b)(iii) (maximum peak particle velocity Vmax table) specifies maximum peak particle velocity limits for inhabited structures located 0 to 300 feet from the blasting site, 301 to 5000 feet from the blasting site, and 5001 and beyond (feet) from the blasting site. Although the Coal Creek Mine Blasting Plan states, at MP-3.3.5, that "Seismograph surveys of each blast are not required at the Coal Creek Mine since there is limited exposure to inhabited structures and other engineered structures", this does not relieve the mine from keeping maximum peak particle velocities with the limits listed above regarding inhabited dwellings *beyond* one-half mile of the permit area. OSM is recommending that the LQD work with Thunder Basin Coal to revise the Coal Creek Mine Blasting Plan to reflect this and to also be consistent with the Coal Creek Mine Blasting Plan at MP-3.3.5 which states, in pertinent part, that "Inhabited structures will remain at the maximum particle velocity given in the previously referenced current LQD Coal Rules and Regulations, Chapter 6, Section 4 (b)(iv)".

Wyoming Coal Rules and Regulations, at Chapter 6, Section 5 (a), require that a record of each blast, including seismograph reports, shall be retained for at least three years and shall be available for inspection by the Administrator and the public on request. The record shall contain the following data....."(See the Wyoming Coal Rules and Regulations, at Chapter 6, Section 5 (a)(i-xvi) for specific blast record information required). The Coal Creek Mine Blasting Plan, at MP-3.3.6, states that "Records of each blast will be retained for a period of at least three years and will be available for inspection." Specific examples of record forms are missing from the Coal Creek Mine Blasting Plan, and so absent an onsite inspection of Coal Creek Mine's blasting records forms, it is impossible for OSM to determine from their blasting plan if the Coal Creek Mine's blasting record forms do in fact contain the information required by the Wyoming Coal Rules and Regulations at Chapter 6, Section 5 (i-xvi).

OSM found that remaining portions of the Coal Creek Mine Blasting Plan meets or exceeds the requirements of the Wyoming Coal Rules and Regulations at Chapter 2, Section 5(a)(vii) and Chapter 6.

<u>Cloud Peak Energy's Cordero Rojo Mine</u>

Wyoming Coal Rules and Regulations, at Chapter 2, Section 5(a)(vii)(E), require that a sample copy of the public notices required by Chapter 6, Section 3 be included in the blasting plan. Although the Cordero Rojo Mine Blasting Plan does include a section at MP-9.2 (Public Notice of Blasting Schedule) which

describes the measures to be taken to notify the public regarding blasting activities, the Blasting Plan does not contain a sample copy of the public notices required by the rule stated above. OSM is recommending that LQD work with Cloud Peak Energy's Cordero Rojo Mine Blasting Plan to include a sample copy of the public notices required by the rule stated above.

OSM found that remaining portions of the Cordero Rojo Mine Blasting Plan meets or exceeds the requirements of the Wyoming Coal Rules and Regulations at Chapter 2, Section 5(a)(vii) and Chapter 6.

Bridger Coal Company's Jim Bridger Mine

OSM found that the Jim Bridger Mine Blasting Plan meets or exceeds the requirements of the Wyoming Coal Rules and Regulations at Chapter 2, Section 5(a)(vii) and Chapter 6.

Corrective Action Taken by LQD

Since notifying LQD of the Black Thunder, Coal Creek, and Cordero Rojo blasting plan deficiencies, the LQD has taken corrective action. On June 13th, 2013, the LQD Blasting Program Principle provided written notification to the Black Thunder, Coal Creek, and Cordero Rojo mines detailing the deficiencies in their respective blasting plans. The LQD also requested prompt submittal of non-significant permit revisions to correct the deficiencies. As of July 9th, 2013, the Black Thunder and Cordero Rojo mines were preparing non-significant permit revisions to be submitted to LQD; the Coal Creek mine submitted a non-significant revision revising the blasting plan language in the permit.

Wyoming Coal Rules and Regulations

In comparing the Wyoming Coal Rules and Regulations regarding blasting to current blasting plans of approved permits, OSM also found that Wyoming's Coal Rules and Regulations regarding blasting at Chapter 6, Section 4, (b)(i)(A), are less effective than the counterpart Federal regulations at 30 CFR 816.67(b)(2)(i), which require periodic monitoring to ensure compliance with airblast standards. The LQD agrees with OSM's finding and will initiate a program amendment to address the rule deficiency. The program amendment process will be initiated no later than March 30, 2014.

Permittee Compliance

As part of the EY 2013 Performance Agreement between LQD and OSM, OSM was to also evaluate LQD's method of checking for permittee compliance with Wyoming Coal Rules and Regulations regarding blasting.

To ensure permittee compliance with the Wyoming Coal Rules and Regulations regarding blasting, the LQD inspects shot reports at each mine during quarterly inspections and also inspects shot reports at the mine or mines in question whenever LQD investigates a blasting complaint. The LQD uses seismographs to monitor shots at complainant's houses and periodically monitors shots on the mine permit to gather vibration and air blast data. The LQD has two semi-permanent seismograph stations

set-up, one on the east side of the Wyodak permit, and the other on the southwest side of the Rawhide permit. These two units are set-up with a marine battery, solar panel charger, and are connected to a modem so the LQD can contact them at any time. LQD staff writes monthly reports that are provided to the LQD Administrator, Wyodak Mine, Rawhide Mine, and the Eagle Butte Mine. These written reports have given LQD a large database of vibration and airblast records near the public that live east of Wyodak's Clovis Pit and in Rawhide Village between Rawhide and Eagle Butte mines. The LQD also conducts periodic blasting oversight inspections at mines in addition to the regular monthly mine inspections.

Based on the information above, OSM feels that the LQD is adequately administering the Wyoming Rules and Regulations regarding blasting. The LQD is engaged in a proactive effort of blast monitoring, shot report inspections, seismograph installation and maintenance, and blast data collection and dissemination in an effort to ensure permittee compliance with Wyoming Coal Rules and Regulations regarding blasting.

Public Outreach/Educational Stakeholder Meeting

As part of the EY 2013 Performance Agreement between LQD and OSM, the LQD and OSM also held an outreach/educational stakeholder meeting on November 19, 2012, to discuss and convey current laws, regulations, the science behind blasting, and current procedures—including what to do if a citizen experiences a negative impact (damages/injury) from blasting, or oxides of nitrogen (NOx) gas.

The outreach/educational stakeholder meeting was held in conjunction with an LQD Advisory Board meeting and started at 1:00PM. The meeting was well attended by mining industry representatives. One member of the public and one member of a stakeholder group were also in attendance. Opening remarks were made by LQD and OSM. OSM and LQD staff then gave a presentation on the current Federal and State laws, rules, and regulations that pertain to blasting. The joint presentation from OSM and LQD also focused on the science behind blasting, how the LQD handles citizen complaints, and what to do if a citizen experiences a negative impact from blasting including what to do if a citizen sees a cloud of NOx gas.

The next presentation was given the Wyoming Mining Association (WMA). WMA's presentation focused on current blasting safety practices, administrative controls, current testing, blasting research, and blast monitoring. The WMA also discussed the overall goals of minimizing the effects of blasting, utilizing the best safety practices, continued research and keeping an open dialogue between regulators, mines, and other stakeholders and the public.

The final presentation was given by the Campbell County Emergency Management Agency. The presentation focused on the Campbell County's notification, advisory and warning systems currently in place. Specific systems discussed included CityWatch, IPAWS/CMAS, EAS, Public Warning Sirens, NOAA weather radio and social media. The Campbell County Emergency Management Agency also agreed to assist in further education of the public regarding the various notification, advisory and warning systems currently in place.

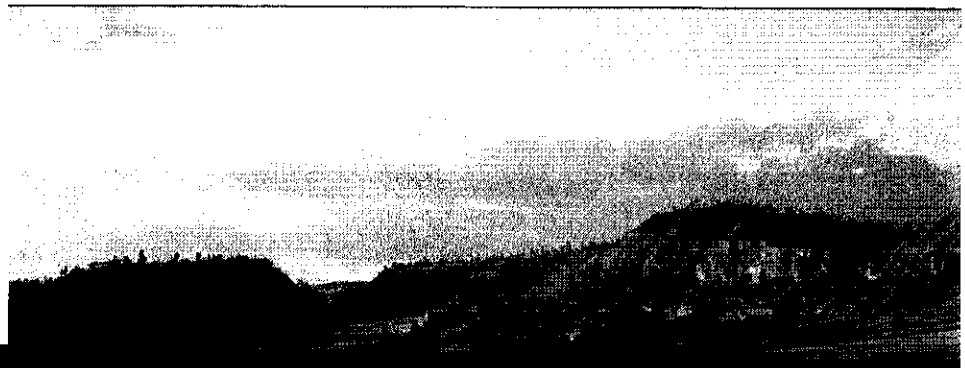
The meeting was then opened up for input and questions. One concerned member of the public spoke of the need to better inform the public of the dangers of NOx gas and the clouds that result from blasting. Another concerned stakeholder, representing the Powder River Basin Resource Council (PRBRC), spoke about: 1) the growing public concern regarding NOx gas and clouds, 2) asked what the mines were doing to prevent NOx clouds, 3) stated that PRBRC members felt that the citizen's complaints regarding blasting weren't being addressed in a timely manner due to current LQD processes, 4) that PRBRC members were pleased with Campbell County and their efforts with notifications, and, 5) the fact that many PRBRC members live in rural areas and are outside of the range of city warning systems.

The meeting was adjourned at approximately 3:30PM.

Exhibit 13

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

politics, organizing, ranching and photography



PHOTOS: HAZARDOUS GAS CLOUDS FROM COAL MINE BLASTING IN SOUTHEASTERN MONTANA

Posted on February 4, 2014 by Alexis Bonogofsky 3 Comments

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On tongue river railroad

Recent Posts

PHOTOS: Wally McRae Live at The Roxy March

Today, blasting at the Rosebud Coal mine owned by Western Energy Company created clouds of hazardous gases which is a common occurrence in coal strip mining.

The actual meteorological conditions at the time of firing the blast will have a significant impact on the fume plume and its local effect, including low cloud cover and inversions.

The orange color indicates a high concentration of nitrogen oxides, including nitrogen dioxide. When inhaled, nitrogen dioxide becomes nitric acid as it encounters moisture in the lungs. Exposure to

22, 2014

How To Catch A Goat (and other life lessons) March 5, 2014

Norm Asbjornson, the guy that just gave $50 Million to MSU, was also the largest donor to Western Tradition Partnership March 4, 2014

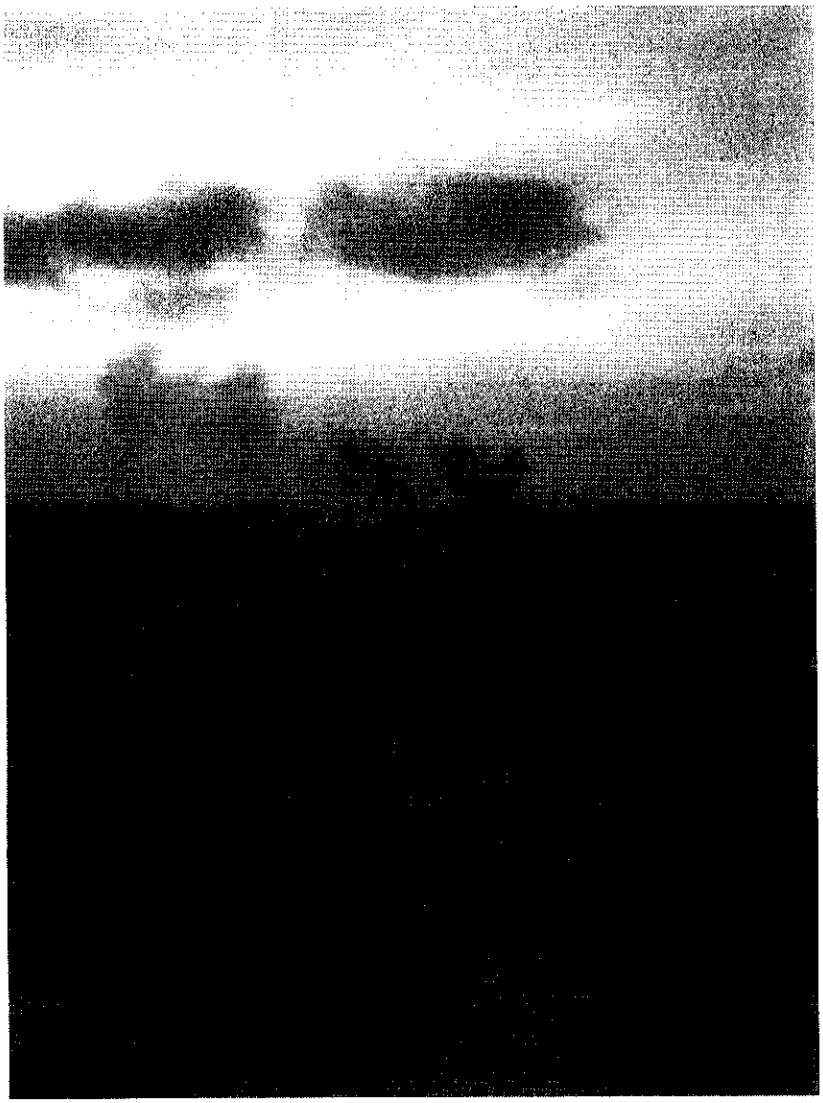
Baby Goat Pro February 28, 2014

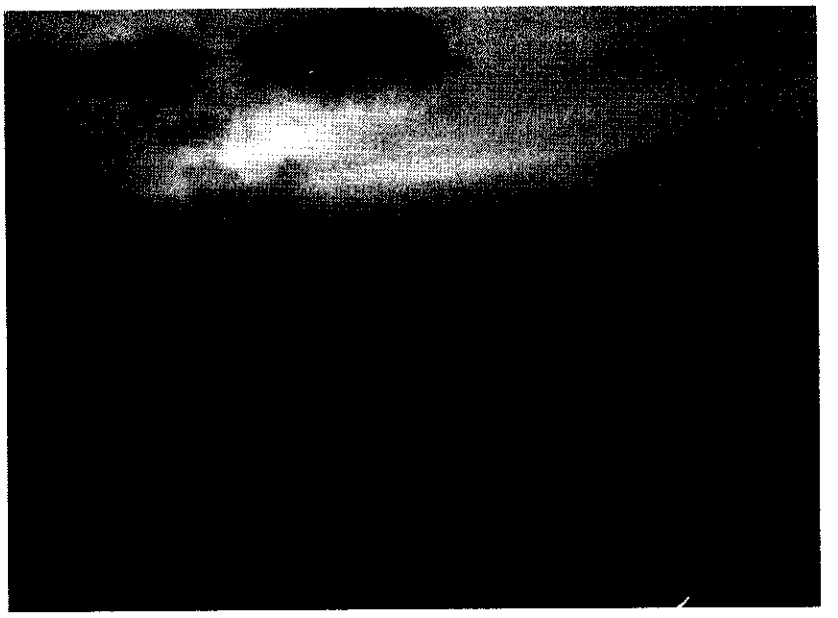
A Series Of Unfortunate Events: Winter Storm Edition February 27, 2014

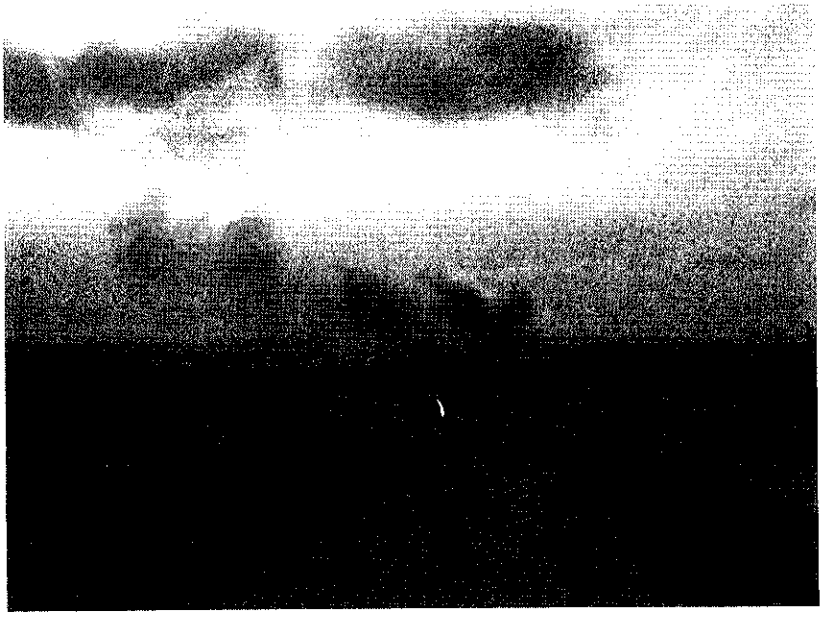
the gas can cause respiratory problems, lung damage and even result in death.

The Rosebud Mine is a 25,000-acre surface mine complex located in the northern Powder River Basin near Colstrip, Montana. The mine has three active pits and supplies almost all of its current production to the four-unit 2,100 megawatt Colstrip coal fired power plant.

Here are photos taken today of the nitrogen clouds from today's blasting.







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‹ Would You Let A Coal Company Take Your Land?

PHOTOS: Birney, Montana Circa 1939-1940 →

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Category: On coal, On EOB Photos Tags: coal, Rosebud Mine, Western

3 Comments on "PHOTOS: Hazardous Gas Clouds From Coal Mine Blasting in Southeastern Montana"

Campbell Howe

February 5, 2014

This is really stunning. Thank you for documenting this tragic pollution

Reply

joan cole

February 5, 2014

Stunning isn't quite the word i'd use Cambell Howe! Tragic, yes! This is what we get for destroying our planet! Injuring inncent people and wildlife……not stunning at all!!!

Reply

Pingback: Weekend Reading: February 21, 2014 | BlogWest.org

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Alexis Bonogofsky

PHOTOS: Wally McRae Live at The Roxy wp.me/p4e1B5-e3

BG Local News

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Exhibit 14

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

Compl 240

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Dave Freudenthal, Governor

John Corra, Director

January 19, 2011

Mrs. Karla Oksanen
205 Battle Cry
HCR 84
Gillette, WY 82716

RE: Blasting Complaint of January 7, 2011; Rawhide Mine; Permit No. 240-T5

Dear Karla:

You called me on January 7, 2011 at about 1:30 PM and told me that a shot that Rawhide Mine had a few minutes before your call rattled your windows, shook the house pretty good, and produced a visible NOx cloud that you took pictures of. Later that afternoon you emailed me the two pictures you took of the NOx fumes.

I started my investigation immediately by calling the Rawhide Mine and requesting the shot report as soon as they had it completed. I also downloaded the State of Wyoming remote seismograph station that is located between the Rawhide pit and your house to check the ground vibration produced from the shot. The mine sent me a copy of the shot report on January 8, 2011. I have reviewed the shot report from the shot on 1-7-2011. The shot was a cast shot in the southwest portion of the West Pit and it contained a total of 293,380 pounds of explosives. The shot had 82 holes on a 26' x 26' pattern with the holes being 11" in diameter. The average depth of the holes was 102' and the average stemming in the holes was 28'. The pattern was initiated with electronic detonators and only one hole was detonated in any 8ms period. The shot was initiated from the south end and progressed to the north, away from your house. It was detonated at 1:16 PM on 1-7-2011. The temperature was about 28°F with wind at 9 mph out of the NW and it was cloudy. The closest protected structure was at the Alpha Coal West Eagle Butte Mine at 5,443' from the shot. The maximum pounds detonated in any 8ms delay period was 4,652 lbs. Using the Eagle Butte Mine structure to determine the allowable pounds that could be shot in any delay period the mine could have legally shot 7,012 lbs. per 8ms. The shot was approximately 6,911' from your house. Legally the mine could have shot 11,304 lbs. per 8ms delay if your house was the closest protected structure. The mine shot about 66% of the maximum pounds per 8ms allowed with the Eagle Butte structure as the closest protected structure. The regulations specify that the maximum allowable ground vibration, or peak particle velocity (ppv), that can be produced at your house is 0.75 inches per second (ips). Mathematically calculating the worst case ground vibration that this shot could have produced at your house gives us a ppv of 0.3915 ips which is considerably lower than the allowable of 0.75 ips. The calculated average ppv that this shot would have produced at your house is 0.1064 ips.

MJK 1/20/11

2100 West 5th Street • SHERIDAN, WY 82801
(307) 673-9337 • FAX (307) 672-2213

The State of Wyoming seismograph station located to the north of your house at N 44°23'45.708" and W 105°31'51.996" was 4,224' from the Rawhide shot of 1-7-2011. This location is clearly shown on the map attached to this letter. The mathematically calculated worst ppv at that location is 0.8275 ips. The recorded ppv was 0.090 ips or less than 11% of the predicted worst case at the seismograph location. The predicted average expected ppv at the seismograph is 0.2248 ips, which means the actual was about 40% of the calculated average expected at the seismograph. If we assume that the actual ground vibration or ppv at your house would be the same percentage of the mathematically calculated worst ppv at your house then the ppv produced by the January 7, 2011 shot at your house would have been around 0.043 ips.

The mine used electronic detonators which give very accurate timing so there is little chance that any holes fired out of sequence. The shot was well designed and adequately delayed. The mine is using a shot program to design the timing on the shots to minimize ground vibration to the neighbors and it appears that it is working very well based on the actual ground vibration recorded compared to what we can calculate it would be based on the charge weight per delay and the distance to the protected structures. The cloud cover might have caused the air pressure pulse to be higher than expected which might have caused the windows to vibrate and dishes to rattle in your house. There is no chance that this shot could have caused any damage to your house. I am sure that you felt it and that it rattled windows and caused some items in the house to move on the wall or shelves but those are nuisance problems and those types of issues will persist with the mine blasting as close as they are to your house.

The regulations are in place to prevent structural damage but there is still potential for nuisance problems from rattling windows, wall hangings moving, dishes in cabinets rattling, etc. However, many of those same problems are caused by human activity in structures along with wind, temperature fluctuations, and other activities.

The NOx fume cloud that your pictures clearly show was produced by the shot at Rawhide on 1-7-2011. The fume cloud appears to be pretty intense and fairly good sized. The mine has commitments to check the wind direction and monitor for temperature inversions prior to initiating cast shots and they followed their procedures in this case. The mine submitted their documentation of the fume clouds direction as it left the blast site and moved to the southeast. The report and map that they used to track the cloud is attached. The Rawhide Blasting Engineer tracked the NOx fumes post blast for about 20 minutes as they moved to the southwest until they reported the fumes had dissipated at 1:35 PM. The map shows the fumes traveled well to the north and east of your house. The pictures you took show an ugly NOx fume cloud produced from this shot but the fumes don't appear to have drifted close to your house and they drifted to the southeast from the blast site across portions of the mine permit and to the north of the Eagle

Butte Mine railroad loop before dissipating.

Based upon my review of the shot report, the seismograph record, and the mine's tracking report on the NOx cloud from the January 7, 2011 shot it was in compliance. The mine appeared to adequately monitor the wind speed and direction and track the NOx fumes as they traveled away from the blast site.

I have attached copies of the pictures you submitted, the seismograph reports, the map showing the location of the shot in relation to your house, and the Rawhide Mine fume tracking information from the shot on 1-7-2011. There are two seismograph records because the mine initiated a signature hole a few seconds prior to the production shot to help determine the timing to use on future shots to minimize ground vibration.

I realize that the fumes in particular are bothersome to you but the casts usually produce NOx fumes and the best way for the mine to assure that people living near the mine are not impacted is to monitor the wind and temperature inversions and not shoot when the wind is blowing toward the neighbors. All the information I have seen would indicate that the wind would have carried the NOx fumes from the blast site to the SE andwell north of you house.

I will encourage the mine to use whatever efforts they can to reduce the NOx fumes from the cast shots in the future but as you know this is an inexact science and none of the mines or blasting companies have been very successful in eliminating NOx fumes from cast shots. The mine followed procedures to make sure the wind wouldn't carry any fumes toward the neighbors and in this case I haven't seen any evidence to dispute that. Wyoming LQD has no standards for exposure limits to NOx and neither does OSM. At this time the best practices are to prevent exposure to people by controlling the shooting time so that any fumes produced by the shot don't drift off the mine permit and toward people living or working near the mine. The weather data on the shot report and that shown at the Gillette airport on 1-7-2011 show the wind speed at about 9 mph and blowing from the NW to the SE. The Rawhide fume tracking sheet supports that information and those conditions would carry the fumes to the SE and well north of your house. I think it is prudent to stay inside anytime you see any NOx fumes from blasting at the neighboring mines, even if the fumes will travel well away from your house, as the wind usually carries any fumes quickly away from any point in the area. The actual concentrations of any fumes will be much lower inside a vehicle or house with the windows closed than what it is outside.

All this information would support the fact that the shot was in compliance with the LQD Surface Coal Rules and Regulations.

If you have any questions, comments, or future complaints please call me.

Sincerely,

Doug Emme
Blasting Engineer

/de
Attachments

xc: Don McKenzie, LQD Administrator (with atts.)
Doug Miller, 198 Crazy Horse Lane, Gillette (with atts.)
Jeff Fleischman, OSM-CFO (with atts.)

C:\FILES\RAW\240DC119.11E

Exhibit 15

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

RioTinto

Mount Thorley Warkworth

MTW-10-ENVMP-SITE-060

Blast Management Plan

30 October 2012

This Blast Management Plan (BMP) describes procedures required to ensure compliance with conditions of the Project Approvals relating to blasting impacts.

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1. Introduction

Warkworth Mine, operated by Warkworth Mining Limited (WML), adjoins Mount Thorley Operations (MTO) which was operated separately until 2004 when the two were integrated into a single operation now known as Mount Thorley Warkworth (MTW). MTW is located in the Singleton Local Government Area of NSW, approximately 15 kilometres south west of Singleton.

WML was granted Project Approval (09 0202) on 3 February 2012 (WML Project Approval) for the Warkworth extension. This project is described in detail in the Environmental Assessment (EA) (EMGA Mitchell McLennan, 2010), which includes a detailed blast assessment and detailed baseline data. The EA supported the application for the WML Project Approval.

The Mount Thorley Coal Mine was approved on 22 June 1996 (modified May 2012) (MTO Modified Project). The MTO Modified Project has identical blasting conditions to the WML Project Approval. The MTO Modified Project is described in detail in the Statement of Environmental Effects (SEE) which supported the application for the MTO Modified Project (EMGA, 2010). Both the EA and SEE contain detailed blast impact assessments.

The WML Project Approval and MTO Modified Project are herein jointly referred to as the Project Approvals.

2. Purpose

This Blast Management Plan (BMP) describes procedures required to ensure compliance with the Project Approvals conditions relating to blasting impacts. This BMP will provide descriptions of the measures that MTW will use to manage blasting operations that will be undertaken. This BMP also provides a mechanism for assessing blast monitoring results against the relevant blast impact assessment criteria.

3. Scope

This BMP will cover the MTW complex which consists of:

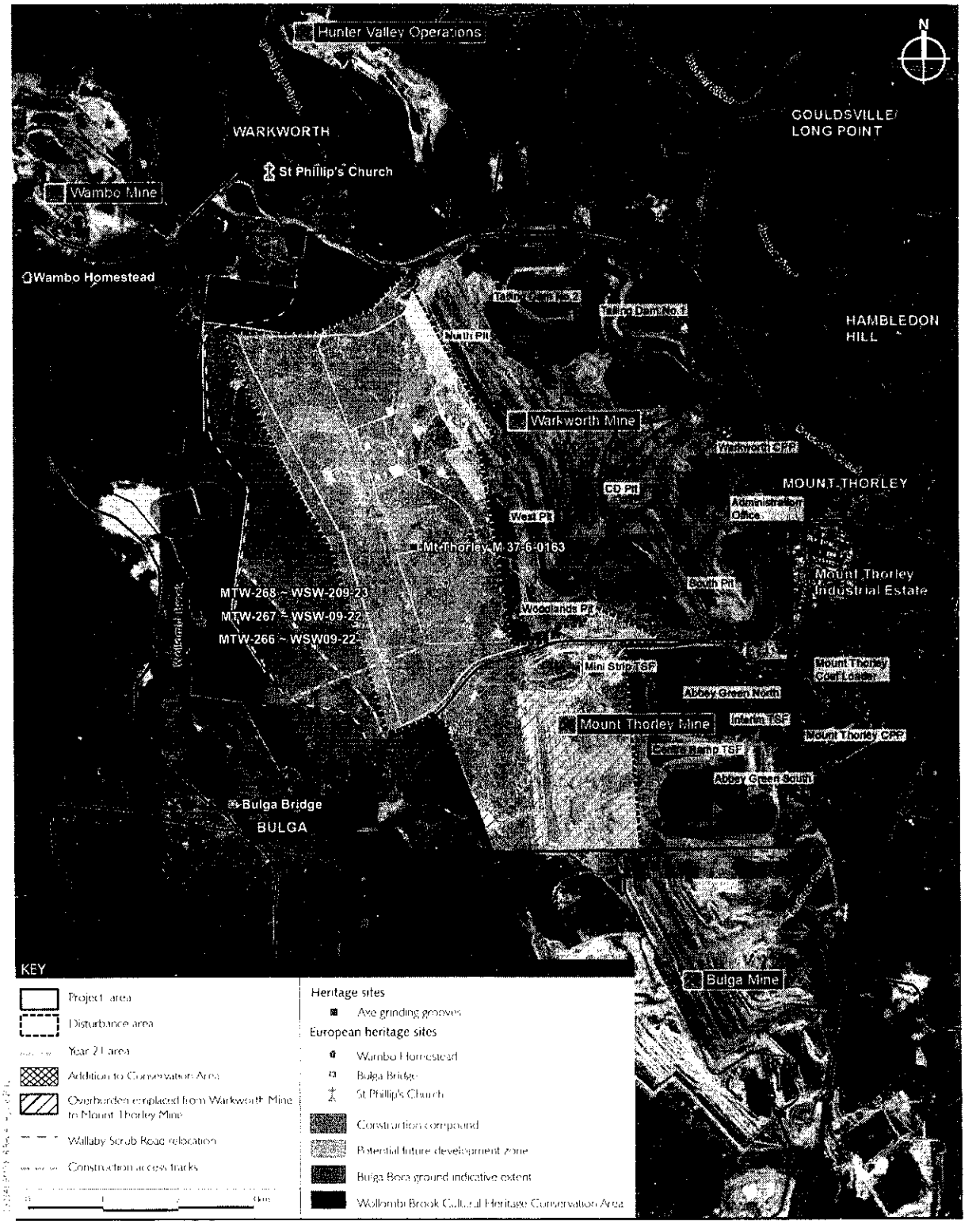
- WML open cut mine;
- MTO open cut mine;
- WML Run Of Mine pad (ROM) and Coal Handling Prep Plant (CHPP);
- MTO ROM and CHPP;
- rail load-out facility; and
- tailings dams.

Figure 1.1 shows the layout of MTW.

4. Objectives

The objectives of this BMP are to:

- detail the controls to be implemented to minimise blasting impacts of site;
- manage community complaints in a timely and effective manner; and
- detail the procedure for reporting blast criteria exceedances to relevant stakeholders.



COAL & ALLIED

Location of Heritage Sites

Blasting management plan

FIGURE 1.1

Definitions

Term	**Definition**
Airblast/Overpressure	An airborne shock wave resulting from detonation of explosives. An airblast may be caused by blasted material movement or the release of expanding gas into the air.
Blasting	Any activity involving the use of explosives for the purpose of producing an explosion to fragment rock for mining.
Flyrock	Rock that is propelled outside of the blasting area through the air or along the ground as a result of the detonation of explosives.
Ground vibration	The movement of the ground caused by the blast wave emanating from the blast.
Particle Velocity	A measure of ground vibration. Particulate velocity describes the velocity at which a particle of ground vibrates when excited by a seismic wave.

5. Regulatory Requirements

5.1 Project Approvals

The Project Approvals were assessed under the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act.). The WML Project Approval was granted by the Planning Assessment Commission as delegate of the Minister for Planning and Infrastructure on 3 February 2012. The MTO Modified Project was granted by the Deputy Director-General as delegate of the Minister for Planning and Infrastructure on 2 May 2012. The requirement for this BMP arises from Condition 20 of Schedule 3 of each of the Project Approvals. A list of the relevant conditions of the Project Approvals and where they are addressed in this BMP is found in **Appendix A.**

5.2 Environmental Protection Licence

Blast Monitoring at MTW will be undertaken in accordance with the relevant Environmental Protection Licence (EPL) conditions for MTW. The EPL includes conditions relating to the blast limits at nearby sensitive receivers and methodology for undertaking blasting monitoring.

5.3 Dangerous Goods

In 2005, amendments to occupational health and safety laws repealed the *Dangerous Goods Act 1975* (NSW) and altered the legislative requirements for the management of dangerous goods in NSW. Following further legislative amendments introduced in January 2012 dangerous goods are now regulated under the *Work Health and Safety Act 2011* (NSW) and *Explosives Act 2003* (NSW). MTW will ensure that all regulatory requirements in relation to dangerous goods management are met. The storage of explosives or explosive precursors, are to be managed in accordance with MTW's management plans; MTW-10-MHMP-241 Major Hazard Management Plan - Explosives and MTW-10-PLAN-240 -MTW SSDS SECURITY PLAN. These are internal documents which are regularly updated.

6. Stakeholder Consultation

As per Condition 20(d) of Schedule 3 of Project Approvals the Road Closure Management Plan, which forms part of this BMP, has been written in consultation with the Singleton Council and Roads and Marine Services (please refer to **Appendix B** - Road Closure Management Plan).

In accordance with Condition 20(f) of Schedule 3 of the Project Approvals, MTW will liaise with neighbouring mines to develop protocols to minimise the cumulative blasting impacts.

7. Blast Impact Assessment Criteria

The Office of Environment and Heritage's (OEH) guidelines for blasting based on comfort levels, which are adapted from the Australian and New Zealand Environment Council's (ANZECC) guidelines titled, '*Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration*' (1990), have been applied for blasting impacts of the MTW site on private residences and other sensitive locations.

7.1 Impact Assessment Criteria

The Project Approvals specify vibration criteria and overpressure criteria for a range of public and privately owned infrastructure (refer to **Tables 7.1** and **7.2**). These criteria were developed in accordance with relevant guidelines, in consultation with the relevant service providers and in consideration of precedents set by other sites and regulatory agencies.

In recognition of the potential impacts of blasting practices, MTW have committed to designing blasts so that predicted levels are within the vibration criteria outlined in the Project Approvals.

7.1.1 Residence on Privately Owned Land

The Project Approvals require compliance with OEH blasting limits and ANZECC guidelines for blasting (ANZECC 1990, see full title above) at residences on privately owned land (refer to **Table 7.1**). However, these criteria do not apply if a written agreement between the relevant land owner and MTW exists and the Department of Planning and Infrastructure (DP&I) have been advised, in writing, of the terms of that agreement.

Table 7.1 - Impact assessment criteria at residences on privately owned land

Location	Airblast overpressure Criteria (dB Linear Peak)	Ground vibration Criteria	Allowable Exceedance
Residence on Privately Owned Land	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months

7.1.2 Public Infrastructure

Public infrastructure is defined in the Project Approvals as "*linear and related infrastructure that provides services to public, such as roads, railways, water supply, drainage, sewerage, gas supply, electricity, telephone, telecommunications, etc...*" The impact assessment criteria

for public infrastructure in proximity to MTW are set out below in **Table 7.2**.These criteria do not apply if a written agreement between the relevant land owner and MTW exists and the DP&I have been advised, in writing, of the terms of that agreement.

Table 7.2 - Impact assessment criteria at all public infrastructure

Location	Airblast overpressure Criteria (dB Linear Peak)	Ground vibration Criteria	Allowable Exceedance
All public infrastructure	-	50, or alternatively a specific limit determined to the satisfaction of the Director-General by the structural design methodology in AS 2187.2-2006, or its latest version.	0%

7.2 Heritage Features

Condition 12 of Schedule 3 of the Project Approvals require that blasting on the site does not damage Wambo Homestead, Bulga Bridge or St Phillips Church and four identified Aboriginal grinding groove sites. The location of these sites is identified in **Figure 1.1**.

Enviro Strata Consulting (ESC) has provided two separate reports; the Blast Impact Assessment of the Warkworth Extension Project on Aboriginal Grinding Groove Sites in **Appendix C** and the Blast Impact Assessment Of The Warkworth Extension Project On Wambo Homestead, St. Phillips Church And Bulga Bridge in **Appendix D** which gives an indication of reasonable ground vibration limits. The results of these reports are summarised below in **Sections 7.2.1** and **7.2.2.** These sites will be monitored as indicated in the PRG-11-00-MTW MTW Blast and Vibration Monitoring Programme.

7.2.1 Aboriginal Grinding Grooves Sites

The four grinding groove sites identified in Condition 12 of Schedule 3 of the Project Approvals, which as per the condition cannot be damaged by blasting operations, are listed with their management strategy below in **Table 7.3**.

Table 7.3 – Grinding Grooves identified in Project Approvals

Site	Location	Management Strategy
MTW-266~WSW-09-22 (266)	Proximity to Wollombi Brook	Remain in situ
MTW-267~WSW-09-22 (267)	Proximity to Wollombi Brook	Remain in situ
MTW-268~WSW-209-23 (268)	Proximity to Wollombi Brook	Remain in situ
M 37-6-0163 (M)	East of Wallaby Scrub Road	To be relocated ahead of mining, this is anticipated within the next two years. In the event blasting occurs within 500 meters of the site M37, MTW will consider installation of flyrock protection.

Vibration modelling was undertaken for the year 9 and 21 mine plans which indicated very low vibration levels for the assessed Sites 266, 267 and 268. Considering the estimated distances (i.e. in excess of 2000 metres from the final pit wall) and estimated vibration exposures, the study identified no major risks related to structural damage for these Aboriginal grinding groove sites.

The analysis revealed that Site M can be exposed to moderate / high blast vibration impacts without any negative impact on the integrity of the grinding grooves. This is due to the robustness of the sandstone material considered. Vibration levels in the order of 250 - 300 mm/s are generally insufficient to cause damage to rock strata. The inferred potential vibration damage level for the considered sandstone material (including grinding grooves) is estimated to be approximately 300 mm/s.

7.2.2 European Heritage Features

The three European Heritage Features identified in Schedule 3 of Condition 12 of the Project Approvals which cannot be damaged, these are the Wambo Homestead, Bulga Bridge and St Phillips Church. For the locations of these European Heritage Features please refer to **Figure 1.1**. Vibration modelling was undertaken for the year 9 and 21 mine plans, (**Appendix D**) which was conservative and considered the worst case scenario. Bulga Bridge - As MTW progresses to the West, MTW will manage blast design to ensure that the blasting criteria of

50mm/s at public infrastructure is met. It is important to note that Bulga Village (refer to table 7.1 for criteria of Bulga village) is adjacent to the Bulga Bridge.

Wambo Homestead and St Phillip's Church currently have other mining operations in close proximity which have a criterion of 5mm/s. MTW will utilise the same criteria of 5mm/s with an allowable exceedance of 5% of the total number of blasts over a period of 12 months.

Wambo Homestead - Independent modelling of the blasts required for the extension was undertaken(please refer to **Appendix D**), it was determined that ground vibration levels from MTW blasts will not reach a level to damage these structures or approach the vibration limit (5mm/s) for other mining operations which are in a closer proximity. To ensure MTW blasts do not approach the criteria of 5mm/s limit with a 5% allowable exceedances during a 12 month period, there will be an internal threshold of 4 mm/s. MTW will investigate additional measures if site law predictions for Wambo Homestead consistently reach 4mm/sec .

St Phillip's Church a blast monitor will be relocated from Warkworth to St Phillip's Church within the next 12 months. As outlined in PRG-11-00-MTW MTW Blast and Vibration Monitoring Programme

7.3 Revision of Impact assessment criteria and Damage criteria

The limits as outlined in **Sections 7.1-7.2** have been developed in consideration of existing requirements of the Project Approvals and also through the completion of research in relation to the impacts of air blast overpressure and vibration on particular structures. On that basis, MTW may (in the future) alter the air blast overpressure and vibration criteria based on results of further detailed assessments and/or through further consultation with relevant government agencies and relevant infrastructure providers, which will then be provided to DP&I in writing.

8. Blast Management Controls

In order to mitigate any potential impacts from blasting activities, a number of management controls will be implemented throughout the life of MTW operations. These controls are detailed in **Section 8.1** below.

8.1 Operational Controls

MTW will implement the following blast management practices over the life of the project:

- Blasting at MTW will only occur on Monday-Saturday between 7am and 5pm. No blasting will be undertaken on Sundays, public holidays or any other time, unless written approval is obtained from the Director-General. MTW will also endeavour to telephone the DP&I's Singleton office to seek verbal approval from the compliance officer(s).
- If blasting is deemed necessary outside of the hours of 7am and 5pm, Monday-Saturday, due to extraordinary circumstances such as safety or unfavourable meteorological conditions, best endeavours will be made to notify, and where timing permits, to secure approval from the DP&I's Singleton office's compliance officer(s) and/or the Director-General.
- Blasting will be undertaken at a maximum of three blasts per day (unless an additional blast is required following a blast misfire) and no more than 15 blasts per week averaged out over a calendar year. However, this total number of blasts does not apply to blasts that generate ground vibration of 0.5mm/s or less at any residence on privately owned land, or to blasts required to ensure the safety of MTW or its workers in accordance with Condition14 of Schedule 3.
- Detailed design is undertaken for each blast in order to maximise the blast efficiency, minimise dust, fumes, ground vibration, airblast and the potential for flyrock and to ensure compliance with site specific blasting conditions;.
- Blasting operations at MTW will be undertaken in accordance with the blasting protocols that will exist between MTW and Bulga, Wambo and Hunter Valley Operations to minimise cumulative blasting impacts, which is also outlined in **Section 8.4**;
- Blasts will be undertaken in accordance with MTW-10-WI-MINE-244-011 Firing a Shot, which is an internal document that is updated regularly. The assessment process for blasting includes:
    - undertaking meteorological assessments prior to blasting to ensure weather conditions are acceptable. In the event that unfavourable meteorological conditions are observed prior to the blast the shot-firer will liaise with the appropriate senior official to determine whether to delay or postpone the blast;
    - review of the blasting permissions page (see example of typical permission page in Appendix F) which considers: time of blast, wind speed and direction.

  - daily notifications are issued to ensure the blast monitors are operating;
  - notification to neighbouring mines, relevant authorities, neighbouring properties and internal contacts prior to blasting; and
  - documentation of the date, location of blast holes and quantity of explosive used each day.
- Detailed monitoring of blasts over the life of MTW at relevant blast sensitive locations (refer to **Section** 9).
- In the event blasting occurs within 500 meters of the site M37, MTW will consider installation of flyrock protection.
- Training will be provided to all relevant personnel on environmental obligations in relation to blasting controls.
- Periodic internal reviews of blast management procedures to evaluate performance and identify corrective action if required.
- MTW will monitor blasts as mining progresses, in accordance with the existing blast monitoring system, so that blast prediction site laws can be further refined and future blast designs can be optimised based on more detailed site information. By adopting this approach, in conjunction with the adoption of improved blasting products and methods, as they are introduced, it is anticipated that blast emissions criteria can be met without imposing any significant constraints on the blast design throughout the operation of MTW.
- MTW will not blast within 500 meters of land not owned by MTW unless:
  - a written agreement with the landowner has been obtained and the DP&I have been advised, or
  - specific measures to ensure the safety of the people or livestock on that land will not be compromised by blasting nor will the blasting result in damage to buildings and/or structures on that land. Those measures will be submitted for acceptance by the Director General and this BMP will be revised accordingly.
- MTW will not carry out more than one blast per day within 500 meters of the Putty Road and Golden Highway.
- Ensuring adequate burden is present on all faces. Where necessary face surveying (laser profiling) techniques may be employed to measure overburden between the blast face and blast holes to ensure sufficient burden is present to prevent blowouts and blast anomalies.
- There may be circumstances where blasts may need to be fired in less than ideal weather conditions. In these circumstances MTW will take additional controls to minimise impacts, such decisions will be elevated up the organisational structure, demonstrating the seriousness of such decisions.
- Minimising the potential for delayed firing of shots which have been loaded into wet holes within the constraints of prevailing weather conditions.

- Blasts will be undertaken with Work Instruction Mount Thorley Warkworth: Post Blast Fume Generation Mitigation and Management Plan to reduce fume on site, please refer to Appendix D.
- Controls for blasting within 500 metres of any public road are addressed in section 8.4.

8.2 Management of Flyrock

The generation of fly rock is managed by incorporating appropriate controls in blast designs. These controls include design of stemming lengths and stemming materials to minimise the potential for generating fly rock. Adequate burden, which is the distance from a charge to a free face, is maintained to minimise the risk of generating fly rock due to face bursting. These measures are used to ensure there is no damage to property, equipment or powerlines from flyrock.

Appropriate stemming will be used to improve stemming confinement and hence reduce the chance of flyrock and elevated blast overpressure.

An appropriate exclusion zone for people and livestock will be established around each blast site in accordance with relevant mine safety regulations prior to firing a blast. The exclusion zone will be established beyond the expected range of any fly rock with an additional safety margin. The establishment of this zone will minimise the risk of any injuries to people or livestock due to fly rock.

Any unusual level of fly rock generated by blasting, with the potential to cause a safety risk, will be noted for each blast. This information will be used to continually re-assess the adequacy of blast design controls in reducing the generation of fly rock. The information will also be used to re-assess the size of the safety exclusion zone established for people and livestock in the vicinity of a blast.

8.3 Management of Aboriginal features

In accordance with Schedule 3 of Condition 12 of the Project Approvals, the following blast related measures will be implemented for the management of the Aboriginal grinding grooves sites:

- Monitor vibration levels and displacement dial gauge readings at Site M37 to inform removal & relocation strategy & timeline.
- Data from these measurements will be analysed, and reviewed in comparison with the information outlined in **section 7.2.1**.
- Investigate any reported exceedances of blast criteria at Site M, to determine if damage has been caused and review mine blasting practice if required.
- Regular visual monitoring will be conducted at sites MTW-266, 267, & 268.
- Although flyrock damage is considered a low risk, management measures to protect the identified grinding groove sites will be explored.

8.4 Road closure

Blasting within 500 meters of a public road requires road closure during the blasting event. MTW have developed a Road Closure Management Plan in consultation with Singleton Council and Roads and Martine Services, please refer to **Appendix B**. Approval will be sought from Singleton Council to temporarily close roads for the purpose of blasting annually; also approval from RMS to temporarily close roads for the purpose of blasting will be sought every six months.

8.5 Blast Management Consultation Protocol

To minimise the potential for blasting to occur simultaneously with neighbouring mines, a communication protocol will be implemented between MTW and Bulga, Wambo and Hunter Valley Operations. Where there is potential for blasts at MTW to occur concurrently with blasting at other mines, blasting times will be varied where possible. The intent of this is to reduce impacts of road closure.

9. Blast Monitoring

As detailed in **Section 8.1** MTW will monitor blasts as mining progresses in accordance with the existing blast monitoring system so that prediction site laws can be further refined and future blast designs can be optimised based on more detailed site information. Blast monitoring will be implemented as outlined in PRG-11-00-MTW MTW Blast and Vibration Monitoring Programme; this is an internal document that is regularly updated.

9.1 Compliance Assessment Protocol - Incident reporting

In accordance with the Protection of the Environment Operations Act 1997 (NSW) (PoEO Act), MTW are required to report pollution incidents immediately to all relevant authorities. Additionally, in accordance with Condition 8 of Schedule 5 of the WML Project Approval and Condition 7 of Schedule 5 of the MTO Modified Project, as soon as practicable after MTW becomes aware of the exceedance of criteria provided in **Tables 7.1** and **7.2.** MTW will report the exceedances to the relevant authorities. For required actions please refer to **Table 10.1**.

In addition, in accordance with Condition 8 of Schedule 5 of the WML Project Approval and Condition 7 of Schedule 5 of the MTO Modified Project, within seven days of becoming aware of the incident, MTW will provide the Director-General and any relevant agencies with a detailed report of the incident.

The report will include the following details:

- The date, time and nature of exceedance/incident;
- Identify the likely cause of exceedance/incident;
- Describe the response action that has been undertaken to date; and
- Describe the proposed measures to address the exceedance/incident.

MTW will implement mitigation measures for future blasts as necessary and will monitor future blasts for effectiveness and improvement opportunities.

In accordance with Condition 3 of Schedule 4 of the Project Approvals, as soon as practicable after obtaining monitoring results showing an exceedance of the criteria shown in **Section 7.1**, MTW will notify the affected landowner and/or tenants in writing of the exceedance, and provide regular monitoring results to each of these parties until the project is complying with the relevant criteria again.

9.2 Property Investigations and Inspections

9.2.1 Property Inspections

In accordance with Condition 1(a) of Schedule 4 of the Project Approvals, MTW has notified all owners of privately-owned land within 2 kilometres of any approved blasting operations that

they are entitled to a structural property inspection to establish the baseline condition of building and other structures on their properties. If a written request is received, MTW will undertake the works in accordance with Condition 16, Schedule 3.

9.2.2 Property Investigations

If MTW receives a written claim that buildings and/or structures on his/her land have been damaged as a result of blasting on site then MTW will undertake works in accordance with Condition 17, Schedule 3.

9.3 Independent Review and Land Acquisition Process

Where the owner of privately-owned land believes that MTW is exceeding blast criteria, then they can request an independent review from the Director General, as per Conditions 4, 5 and 6 of Schedule 4 of the Project Approvals. If the independent review determines that MTW is not complying with the relevant acquisition criteria, then upon receiving written request from the land owner, MTW will act in accordance with Conditions 8 and 9 of Schedule 4.

10. Reporting and Reviewing

10.1 Internal reporting

Determining exceedances of blasting criteria will be undertaken in accordance with a site developed Blast exceedance Protocol document. The Environmental Coordinator will report to the Mine Manager the results of investigations of any complaints and any exceedances of the blast overpressure or vibration assessment criteria (refer to **Section 7**).

If there is a non-compliance with the blast impact assessment criteria an internal report dealing with the circumstances of the non-compliance and resulting actions will be developed. External reporting of the non-compliance will be undertaken in accordance with **Section 10.2** and **Table 10.1**.

10.2 External Reporting

A summary of all blast monitoring results will be made publicly available on the MTW website in accordance with Condition 14 of Schedule 5 of the MTW Project Approval and Condition 11 of Schedule 5 of the MTO Modified Project. In accordance with the PoEO Act MTW will also provide the monitoring data on the MTW website within 14 days of obtaining the data.

MTW will provide up to date information regarding the proposed blasting schedule via the process outlined below:

- notify neighbouring mining operations;
- advertisement in the Singleton Argus when a public road is to be closed, as well as identifying proposed blasting times on road signage established in the vicinity of MTW;
- providing an overview of the blasting practices on the MTW website which also includes a contact number for any community enquiries; and
- Providing up-to-date information to the blasting hotline 1800 099 669.

Additionally, the Annual Review (formerly Annual Environmental Management Report) prepared each year for MTW will include all blast monitoring results for the corresponding year, in accordance with Schedule 5, Condition 4 of the Project Approvals. The Annual Review will also include an assessment of the blast monitoring results against the blast impact assessment criteria and any trends over the period. In addition, any complaints relating to blasting received at MTW and response actions taken will also be reported in the Annual Review.

A summary of blast monitoring results will also be presented to the MTW Community Consultative Committee (CCC) meetings which are held three times per calendar year.

10.3 Complaints Response

The Environmental Services department will maintain a centralised location to record communication details of relevant external stakeholders. Complaints will be handled in accordance with CNA-09-EWI-SITE-003 Environmental Complaints Line work instruction, which is an internal document regularly updated.

The Complaints Procedure will utilise the Community Complaints Hotline, 1800 656 892 that will be regularly advertised in the Singleton Argus. The Complaints Hotline will be in operation 24 hours per day, seven days a week. Complaints will be recorded and investigated by environmental staff. All other complaints lodged via letter, in person or by fax, will also be recorded and investigated by the Environmental Coordinator. An initial response to the complainant will be made as soon as practicable by the environmental staff.

Follow up correspondence with the complainant will be made explain the outcome of the complaint investigation.

Table 10.1 summarises the potential blasting related issues that may arise and the required action to be taken.

Table 10.1 – Required Actions

Aspect	Required Action
Exceedance of the Environmental Protection Licence conditions for airblast or ground vibration	Investigation of exceedance, undertaking mitigating measures for future blasting where applicable. Report exceedance to OEH and senior management, as required (refer to **Section 10.1**).relevant exceedances are also reported in the Annual Return.
Exceedance of the conditions of the Project Approvals for airblast or ground vibration	Report details of the exceedance and provide a copy of NSW Health Fact Sheet "Mine Dust and You to affected landowners. Provide affected landowners with subsequent monitoring results as soon as practicable in writing until compliance is demonstrated. Report exceedance as soon as possible, once the exceedance has been confirmed to the Director-General and other relevant agencies. Following with a report to the Director-General 7 days post confirmation of the exceedance post-analysis. Exceedances are also reporting in the Annual Review and to the CCC
Community complaint	Investigation of complaint, undertaking mitigation measures where applicable and provided feedback to complainant. Reporting complaint to senior management. Provide feedback to mine planning and production personnel, where relevant (refer to **Section 10.3**)

Private property damage as a result of blasting operations	Investigation of issue in accordance with Condition 17 of Schedule 3 of the Project Approvals, and initiation of measures detailed in Condition 8 and 9 of Schedule 4 of the Project Approvals where appropriate. Report issue to senior management (refer to **Section 10.2 and 10.3**)

10.4 Monitoring Records

In accordance with EPL conditions, PRG-11-00-MTW MTW Blast and Vibration Monitoring Programme and as per MTW document control procedures, monitoring records will be maintained on site for at least four years.

10.5 Review

This BMP and associated monitoring plan will be reviewed, and if necessary revised to the satisfaction of the Director-General (in consultation with relevant government agencies),

- in accordance with Condition 5 of Schedule 5 of the Project Approvals within 3 months of the submission of an:
  - annual review under Condition 4 of Schedule 5 of the MTO Modified Project and Condition 4 of Schedule 5 of the WML Project Approval;
  - incident report under Condition 7 of Schedule 5 of the MTO Modified Project and Condition 8 of Schedule 5 of the WML Project Approval;
  - Independent Environmental Audit report under Condition 9 of, Schedule 5 of the MTO Modified Project and Condition 12 of Schedule 5 of the WML Project Approval; and
  - Modification to the conditions of the Project Approval.
- When there are changes to the Project Approvals or EPL conditions relating to blast management or monitoring;
- Following significant incidents at MTW relating to blasting;
- Following the conduct of an independent environmental audit which requires changes to the Blast Management Plan or to the blast monitoring practices; or
- If there is a relevant change in technology or legislation.

In accordance with Condition 10 of Schedule 5 of the WML Project Approval, by the end of June 2012 and annually thereafter until the Director-General is satisfied that MTW is implementing best noise, blasting and air quality management practice; MTW will commission an independent noise, blast and air quality audit.

In accordance with Condition 12 of Schedule 5 of the WML Project Approval and Condition 9 of Schedule 5 of the MTO Modified Project, by the end of June 2014 and every three years thereafter, MTW will commission an Independent Environmental Audit to the satisfaction of the DP&I. The audit will include an assessment of the adequacy of the BMP. Where necessary, following the audit, the BMP will be updated and action will be taken to improve blasting performance and blasting management practices.

11. Responsibilities

Table 11.1 – Responsibilities

General Manager	• Provide adequate resources for the implementation of the BMP • Authorize the implementation of specific management measures to minimise blast impacts in accordance with this BMP
Environmental Services Manager	• Oversee the implementation of the BMP • Co-ordinate blast monitoring in accordance with this BMP • Ensure that the results of the monitoring are systematically evaluated and reported to relevant personnel for consideration as part of the ongoing mine planning • Notify regulatory authorities and affected landholders of any blasting related exceedance and undertake associated reporting • Authorise internal and external reporting requirements as well as subsequent revisions of the BMP • Ensuring the outcomes of monitoring are systematically evaluated as part of the ongoing mine planning • Ensure all internal and external reporting requirements are met • Ensure copies of the BMP are available on the MTW website • Develop and maintain a protocol to minimise the potential for simultaneous blasting with other nearby mines • Co-ordinate periodic reviews of the BMP
Environmental Coordinator	• Co-ordinate investigations of blasting exceedances, incidents or complaints with the Drill and Blast Engineer • Co-ordinate and manage records and reporting of blast monitoring results • Manage blasting related complaints in accordance with complaints management procedure • receive daily notifications to ensure the blast monitors are operating

Drill and Blast Engineer	• Regularly review blast design parameters on the basis of blast monitoring records • Design and undertake blasts to comply with the requirements of this BMP • Advise the relevant personnel of weekly blasting schedule • Maintain records for blasts initiated • Assist the Environmental Coordinator with the investigations into blasting exceedances, incidents or complaints
Drill and Blast Superintendent	• Liaise with the shot-firers to ensure blasting is being conducted under favorable metrological conditions.
Shot-firers	• Notify the Drill and Blast Engineer and Blasting Supervisor of any factors that may lead to non-compliance with this BMP • Load and fire blasts in accordance with design supplied by the Drill and Blast Engineer • Assess meteorological conditions prior to blasting to determine whether conditions are appropriate for blasting
Blasting Supervisor	• Advise relevant personnel of daily blasting schedule • Ensure that the blast is loaded with the correct quantity and quality of explosive and stemmed in accordance with the blast design • Ensure maintenance of the blasting hotline • Send SMS when road closures are altered more than 1 hour outside the 'window' provided on the blasting hotline.
Drill supervisor	• Ensure drill patter is drilled in accordance with the blast design
Drillers	• Record drill status, including hole depths, pattern and relevant information

References

- Australian and New Zealand Environment and Conservation Council ANZECC. 1990. Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration.
- EMGA, January 2010. Abbey Green Project Alterations Statement of Environmental Effects.
- EMGA Mitchell McLennan, April 2010. Proposed Warkworth Extension Environmental Assessment.
- EMGA Mitchell McLennan September 2011. Proposed Warkworth Extension Preferred Project Report.
- *Environmental Planning and Assessment Act 1979* (NSW)
- MTW-10-MHMP-241 Major Hazard Management Plan - Explosives
- MTW-10-PLAN-240 -MTW SSDS Security Plan
- MTW-10-WI-MINE-244-011 Firing a Shot
- OEH's 'Approved methods for the sampling and analysis of air pollutants in NSW' (EPA, 2011) which refers to Australian Standards AS2923 – 1987 (Guide for measurement of horizontal wind for air quality applications).
- *Work Health and Safety Act 2011* (NSW)
- *Explosives Act 2003* (NSW).
- PRG-11-00-MTW MTW Blast and Vibration Monitoring Programme
- PRG-11-00-MTW MTW Blast and Vibration Monitoring Programme
- *Protection of Environmental Operations Act 1997* (NSW)

List of Appendices

Appendix A – Approval Conditions

Appendix B - Road Closure Management Plan

Appendix C - Blast Impact Assessment of the Warkworth Extension Project on Aboriginal Grinding Groove Sites

Appendix D -Blast Impact Assessment of the Warkworth Extension Project on Wambo Homestead, St. Phillips Church and Bulga Bridge

Appendix E - Post Blast Fume Generation Mitigation and Management Plan

Appendix F - Example of Typical Blasting Permissions Page

Document Control

	Name	Position	Signed	Date
Originator:	Nicola Proctor	Coordinator - Project Approvals	-	31/08/012
	Kelly O'Mullane	Specialist - Project Approvals		30/10/12
Checked By:	Gerard Gleeson	Environmental Specialist - Systems and Monitoring		30/10/12
Owner:	Gerard Gleeson	Environmental Specialist - Systems and Monitoring		30/10/12
Authorised By:	Mark Nolan	Manager Project Approvals		30/10/12

Revisions

Version	Date	Revision Description	Author	Approved by
1.0	31/08/2012	Draft as submitted to Department of Planning and Infrastructure.	Nicola Proctor	Mark Nolan
1.1	26/09/2012	Final draft submitted to Department of Planning and Infrastructure for approval.	Kelly O'Mullane	Mark Nolan
1.2	30/10/2012	Revised final draft submitted to Department of Planning and Infrastructure for approval and approved by the Director-General on 31/10/2012.	Kelly O'Mullane	Mark Nolan

Appendix A – Approval Conditions

Table A.1 – WML Relevant Project Approval Conditions

Schedule	Condition	Document Reference
3	**Blasting Criteria** 11. The Proponent shall ensure that the blasting on the site does not cause exceedances of the criteria in Table 8. However, these criteria do not apply if the Proponent has a written agreement with the relevant owner, and has advised the Department in writing of the terms of this agreement.	Section 7.1
3	12. The Applicant shall ensure that blasting on the site does not damage: (a) the Wambo Homestead, Bulga Bridge, or St Phillips Church;	Sections 7.2 and 8.4
	(b) Aboriginal grinding groove sites: • MTW-266 ~ WSW-09-22; • MTW-267 ~ WSW-09-22; • MTW-268 ~ WSW-09-23; and (c) Aboriginal grinding groove site Mt Thorley M 37-6-0163 (before it is relocated)	Sections 7.2.1 and 8.3
3	**Blasting Hours** 13. The Proponent shall only carry out blasting on site between 7am and 5pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Director-General.	Section 8.1
3	**Blasting Frequency** 14. The Proponent may carry out a maximum of: (a) 3 blasts a day, unless an additional blast is required following a blast misfire; and (b) 15 blasts a week, averaged over a calendar year, for all operations at the Mt Thorley-Warkworth mine complex. This condition does not apply to blasts that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, or blasts required to ensure the safety of the mine or its workers. *Note: For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.*	Section 8.1
3	15. The Proponent shall not carry out more than 1 blast a day within 500 metres of the Putty Road and Golden Highway.	Section 8.1

Schedule	Condition	Document Reference
3	**Property Inspections** 16. If the Proponent receives a written request from the owner of any privately-owned land within 2 kilometres of the approved open cut mining pit/s on site for a property inspection to establish the baseline condition of any buildings and/or structures on his/her land, or to have a previous property inspection updated, then within 2 months of receiving this request the Proponent shall: (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to: • establish the baseline condition of any buildings and other structures on the land, or update the previous property inspection report; and • identify measures that should be implemented to minimise the potential blasting impacts of the project on these buildings and/or structures; and (b) give the landowner a copy of the new or updated property inspection report. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Proponent or the landowner disagrees with the findings of the property inspection report, either party may refer the matter to the Director-General for resolution.	Section 9.2.1
3	**Property Investigations** 17. If the owner of any privately-owned land claims that buildings and/or structures on his/her land have been damaged as a result of blasting on the site, then within 2 months of receiving this claim the Proponent shall: (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and (b) give the landowner a copy of the property investigation report. If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Proponent shall repair the damage to the satisfaction of the Director-General. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Proponent or the landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Director-General for resolution.	Section 9.2.2

Schedule	Condition	Document Reference
3	**Operating Conditions** 18. During mining operations on site, the Proponent shall: (a) implement best management practice to: • protect the safety of people and livestock in the surrounding area;	Sections 8.1 and 8.2
	• protect public or private infrastructure/property in the surrounding area from any damage; and	Sections 7.1.2 and 8.1
	• minimise the dust and fume emissions of any blasting;	Section 8.1
	(b) minimise the frequency and duration of any road closures, and avoid road closures during peak traffic periods;	Section 8.5
	(c) co-ordinate the timing of blasting on site with the timing of blasting at nearby mines (including the Bulga, Wambo, and Hunter Valley Operations mines) to minimise the cumulative blasting impacts of these mines and the Mt Thorley-Warkworth mine complex; and	Sections 8.6 and 8.1
	(d) operate a suitable system to enable the public to get up-to-date information on the proposed blasting schedule on site, to the satisfaction of the Director-General.	Section 10.2
	19. The Proponent shall not undertake blasting on site within 500 metres of: (a) any public road without the approval of the appropriate road authority; or (b) any land outside the site that is not owned by the Proponent, unless: • the Proponent has a written agreement with the relevant landowner to allow blasting to be carried out closer to the land, and the Proponent has advised the Department in writing of the terms of this agreement, or • the Proponent has: - demonstrated to the satisfaction of the Director-General that the blasting can be carried out closer to the land without compromising the safety of the people or livestock on the land, or damaging the buildings and/or structures on the land; and - updated the Blast Management Plan to include the specific measures that would be implemented while blasting is being carried out within 500 metres of the land.	Sections 8.1 and 8.5
3	**Blast Management Plan** 20. The Proponent shall prepare and implement a Blast Management Plan for the project to the satisfaction of the Director-General. This plan must: a) be submitted to the Director-General for approval by the end of September 2012;	

Schedule	Condition	Document Reference
	(b) propose and justify any alternative ground vibration limits for any public infrastructure in the vicinity of the site;	
	(c) describe the measures that would be implemented to ensure: • best management practice is being employed;	Sections 8.1
	• compliance with the relevant conditions of this approval;	Section 10.2
	(d) include a road closure management plan for blasting within 500 metres of a public road, that has been prepared in consultation with the RTA and Council;	Section 8.5
	(e) include a monitoring program for evaluating the performance of the project, including: • compliance with the applicable criteria	Section 9
	• any blasting impacts on the heritage items specified in condition 12 above; and	Section 7.2
	• minimising the fume emissions from the site	Section 8.1
	(f) include a protocol that has been prepared in consultation with the owners of nearby mines (including the Bulga, Wambo and Hunter Valley Operations mines) to minimise the cumulative blasting impacts of these mines and the Mt Thorley-Warkworth mine complex.	Sections 8.1 and 8.6

Table A.2 – MTO Relevant Project Approval Conditions

Schedule	Condition	Document Reference
3	**Blasting Criteria** 11. The Applicant shall ensure that the blasting on site does not cause exceedances of the criteria in Table 7. However these criteria do not apply if the Applicant has a written agreement with the relevant owner, and has advised the Department in writing of the terms of this agreement.	Section 7.1
3	12. The Applicant shall ensure that blasting on the site does not damage: (a) the Wambo Homestead, Bulga Bridge, or St Phillips Church;	Sections 7.2 and 8.4
	(b) Aboriginal grinding groove sites: • MTW-266 ~ WSW-09-22; • MTW-267 ~ WSW-09-22; • MTW-268 ~ WSW-09-23; and (c) Aboriginal grinding groove site Mt Thorley M 37-6-0163 (before it is relocated)	Sections 7.2.1 and 8.3
3	**Blasting Hours** 13. The Applicant shall only carry out blasting on site between 7am and 5pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Director-General.	Section 8.1
3	**Blasting Frequency** 14. The Applicant may carry out a maximum of: (a) 3 blasts a day, unless an additional blast is required following a blast misfire; and (b) 15 blasts a week, averaged over a calendar year, for all operations at the Mt Thorley-Warkworth mine complex. This condition does not apply to blasts that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, or blasts required to ensure the safety of the mine or its workers. *Note: For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.*	Section 8.1
3	15. The Applicant shall not carry out more than 1 blast a day within 500 metres of the Putty Road and Golden Highway.	Section 8.1

Schedule	Condition	Document Reference
3	**Property Inspections** 16. If the Applicant receives a written request from the owner of any privately-owned land within 2 kilometres of the approved open cut mining pit/s on site for a property inspection to establish the baseline condition of any buildings and/or structures on his/her land, or to have a previous property inspection updated, then within 2 months of receiving this request the Applicant shall: (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to: • establish the baseline condition of any buildings and other structures on the land, or update the previous property inspection report; and • identify measures that should be implemented to minimise the potential blasting impacts of the development on these buildings and/or structures; and (b) give the landowner a copy of the new or updated property inspection report. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the property inspection report, either party may refer the matter to the Director-General for resolution.	Section 9.2.1
3	**Property Investigations** 17. If the owner of any privately-owned land claims that buildings and/or structures on his/her land have been damaged as a result of blasting on the site, then within 2 months of receiving this claim the Applicant shall: (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and (b) give the landowner a copy of the property investigation report. If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant shall repair the damage to the satisfaction of the Director- General. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Director-General for resolution.	Section 9.2.2

Schedule	Condition	Document Reference
3	**Operating Conditions** 18. During mining operations on site, the Applicant shall: (a) implement best management practice to: • protect the safety of people and livestock in the surrounding area;	Sections 8.1 and 8.2
	• protect public or private infrastructure/property in the surrounding area from any damage; and	Sections 7.1.2 and 8.1
	• minimise the dust and fume emissions of any blasting;	Section 8.1
	(b) minimise the frequency and duration of any road closures, and avoid road closures during peak traffic periods;	Section 8.5
	(c) co-ordinate the timing of blasting on site with the timing of blasting at nearby mines (including the Bulga, Wambo, and Hunter Valley Operations mines) to minimise the cumulative blasting impacts of these mines and the Mt Thorley Warkworth mine complex; and	Sections 8.6 and 8.1
	(d) operate a suitable system to enable the public to get up-to-date information on the proposed blasting schedule on site, to the satisfaction of the Director-General.	Section 10.2
3	19. The Applicant shall not undertake blasting on site within 500 metres of: (a) any public road without the approval of the appropriate road authority; or (b) any land outside the site that is not owned by the Applicant, unless: • the Applicant has a written agreement with the relevant landowner to allow blasting to be carried out closer to the land, and the Applicant has advised the Department in writing of the terms of this agreement, or • the Applicant has: – demonstrated to the satisfaction of the Director-General that the blasting can be carried out closer to the land without compromising the safety of the people or livestock on the land, or damaging the buildings and/or structures on the land; and - updated the Blast Management Plan to include the specific measures that would be implemented while blasting is being carried out within 500 metres of the land.	Sections 8.1 and 8.5

Schedule	Condition	Document Reference
3	**Blast Management Plan** 20. The Applicant shall prepare and implement a Blast Management Plan for the development to the satisfaction of the Director-General. This plan must: (a) be submitted to the Director-General for approval by the end of September 2012;	
	(b) propose and justify any alternative ground vibration limits for any public infrastructure in the vicinity of the site;	
	(c) describe the measures that would be implemented to ensure: • best management practice is being employed; • compliance with the relevant conditions of this consent;	Sections 8.1
	(d) include a road closure management plan for blasting within 500 metres of a public road, that has been prepared in consultation with RMS and Council;	Section 10.2
	(e) include a monitoring program for evaluating the performance of the development, including: • compliance with the applicable criteria • any blasting impacts on the heritage items specified in condition 12 above; and • minimising the fume emissions from the site; and	Section 8.5
	(f) include a protocol that has been prepared in consultation with the owners of nearby mines (including the Bulga, Wambo and Hunter Valley Operations mines) to minimise the cumulative blasting impacts of these mines and the Mt Thorley-Warkworth mine complex.	Section 9

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Appendix B - Road Closure Management Plan

COAL & ALLIED

A Rio Tinto Group Company

MTW ROAD CLOSURE MANAGEMENT PLAN

Document Information:

Author: Signature..... Date.....

Reviewer: Signature..... Date.....

Authoriser: Manager – Project Approvals, NSW

Signature..... Date.....

Issue	*Issue Date*	*Originator*	*Reviewed*	*Approved*
1	31 August 2012	Nicola Proctor		Mark Nolan
2	26 September 2012	Kelly O'Mullane		Mark Nolan
3	30 October 2012	Kelly O'Mullane	Gerard Gleeson	Mark Nolan

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1. PURPOSE

This Road Closure Management Plan outlines practices and processes for blasts that require the closure of roads by Mount Thorley Warkworth Mining Complex (MTW).

2. OBJECTIVE

The primary objective of this plan is to safely manage temporary road closures of Putty Road, Wallaby Scrub Road, Charlton Road, Golden Highway or combinations thereof for the purposes of blasting.

Fundamental to achieving this objective is to:

- Ensure safety and protection of potentially affected persons and property;
- Minimise road closure periods;
- Minimise inconvenience on road users, local residents and businesses;
- Notify in advance relevant stakeholders, including the public, of blasts that will temporarily close either Putty, Charlton or Wallaby Scrub Roads or Golden Highway or combination thereof; and
- Ensure that emergency service activities are not restricted by road closure events.

There are a number of mitigation strategies that will be implemented to manage the road closures. Road closures are managed according to MTW's internal work instruction - ***MTW-10-WI-MINE-244-009 Closing Public Roads*** and pursuant to a Traffic Control Plan for each road that has been separately prepared, submitted and approved by the Singleton Council.

Road closures on each road follow protocols identified in the Traffic Control Plan for that road. A separate Traffic Control Plan will be developed for each road closure configuration.

SCOPE

This plan outlines:

- The requirements for blasting within 500m of Putty Road, Wallaby Scrub Road, Charlton Road and Golden Highway
- Singleton Council's requirements for closing a public road for blasting activities
- Responsibilities for road closure
- Remedial action measures
- Flyrock management
- Major hazards before controls are implemented

3. DEFINITIONS

Blast	An initiation of explosives within the confines of the open cut approval area with the purpose of fragmenting rock or coal.
Flyrock	Rock material that is propelled through the air or along the ground as a result of the detonation of explosives.
Fume	A combination of post blast gases, which are predominately nitrogen dioxide but may also include nitrous oxide, nitric oxide, carbon monoxide and carbon dioxide.
Dust	Airborne particulate matter.

4. MANAGEMENT OF TEMPORARY ROAD CLOSURES

The key aspects covered include:

- Procedures for road and traffic closures
- Traffic Control Plan
- Personnel involved – roles and responsibilities
- Major hazards
- Notification of appropriate parties

- A protocol for management of emergency vehicles
- Management of dust and fume
- Management of flyrock
- Evaluation and auditing / reporting procedures

5. PROCEDURES FOR ROAD AND TRAFFIC CLOSURES

5.1 Temporary Road Closure

Roads nominated for temporary road closure consideration: Putty Road, Wallaby Scrub Road, Charlton Road and Golden Highway.

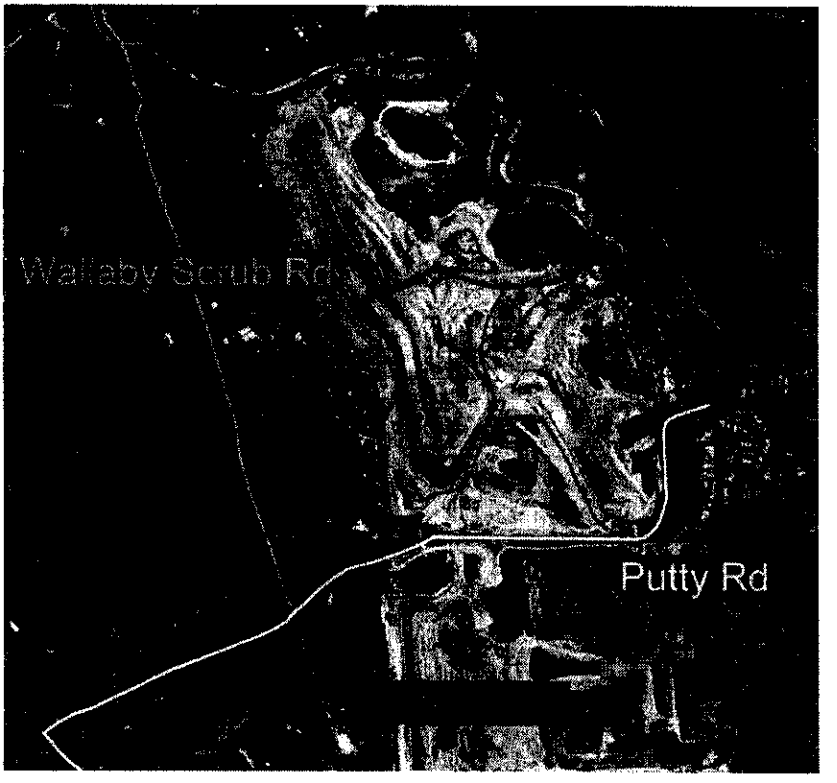

Figure 2: Aerial photo depicting the roads

Roads will be temporarily closed whenever blasting is carried out within 500m of the road or to ensure public safety. These closures will be typically for a period of less than 15 minutes.

Authorised personnel who have received Roads and Marine Services (RMS) approved traffic controller training will manage traffic flow during these closures.

Traffic control signs will be set up in accordance with the approved traffic control plan.

Temporary road closures will be scheduled, where practicable, for outside peak traffic flow periods.

Closures will occur just prior to the blast, and reopening will occur only after a thorough safety inspection has been completed. Closures will occur at strategic locations along the road that are highly visible to oncoming traffic and will seek to minimise potential impacts on road users accessing alternate routes. Closure locations will take into consideration the accumulated traffic volume so as where possible, normal traffic access to side roads is not compromised. Specific locations of the closure points will be determined during preparation of the Traffic Control Plan. Road closures are likely to occur up to four times per week. Blasts requiring road closures will not be conducted when adverse environmental conditions (or other prevailing conditions) make road closures hazardous.

The duration of closure events will be minimised by delaying closures until just prior to blasts and by completing post-blast safety inspections immediately following blasts. Although Mount Thorley Warkworth (MTW) will endeavour to minimise the duration of closures, public safety is the primary objective and will not be compromised by efforts to reduce closure duration. It is envisaged that road closures will occur for a period of approximately 10-15 minutes.

Misfires identified while public roads are closed will be treated as separate blasts to avoid lengthy road closures. In addition to measures to minimise the duration of closures on an event basis, road closures will be minimised on a weekly basis by designing blasts to minimize the number of road closures required and by scheduling blasts requiring road closure to achieve an even distribution among weeks where practicable. Road closures will be scheduled to avoid peak traffic periods as far as practicable and will generally occur Monday-Saturday between the hours of 9am - 5pm. Where possible, school bus times will be avoided.

5.2 Traffic Control Plan

The following procedures will be implemented:

- Both vehicular and pedestrian access will be prevented during blasting activities when a blast occurs within 500m of nominated roads
- Traffic controllers will be utilised to control traffic on Putty Road, Wallaby Scrub Road, Charlton Road and Golden Highway to prevent access to the area
- All affected roads will be inspected immediately following the blast to ensure no damage to the road surface has occurred and to remove any flyrock should it occur.
- Traffic will only be permitted to proc eed through the area after approval to do so, and approval has been received from the shotfirer in charge of the blast, following measurement of gaseous fume levels by handheld monitoring to an acceptable level (equal or less than 1ppm NO2 and 200ppm CO).

5.3 Personnel involved – roles and responsibilities

Drill & Blast Engineer:

- Notify Singleton Council of planned blasting within 500m of Putty Road and/or Wallaby Scrub Road and/or Charlton Road or Golden Highway one day prior to blast
- Coordinate road closure signage on Putty Road, Wallaby Scrub Road, Charlton Road and Golden Highway including updating for delayed blasts
- Coordinate blasting times with neighbouring mines
- Advertise road closure in Singleton Argus
- Notify residents who have driveways affected by road closures

Blast supervisor:

- Update phone information to inform callers of road closure details
- Organise traffic controllers for (Putty Road, Wallaby Scrub Road, Charlton Road and Golden Highway) as required.

- Co-ordinate inspection of (Putty Road, Wallaby Scrub Road, Charlton Road and Golden Highway) pre and post blast, and apply remedial actions as required.

Shotfirer:

- Whilst the Shotfirer-in-Charge is ultimately the person accountable for the blast on site, the 'Road Runner' manages operations on the public road itself.

Road Runner:

- The 'Road Runner' is an MTW employee who is charged with responsibility of ensuring the public road is secured and cleared.
- Instruct the Traffic Controllers to close and open the road when directed by the Shotfirer-in-Charge.
- Clear the public road between the Traffic Controllers in a systematic manner to ensure that the road is clear of people or vehicles at risk.
- In the event where dust/fume/blast debris are covering the road, inform traffic controllers to maintain closure until notified by Road Runner.

Traffic Controller:

- Close and secure open the public road in accordance with the 'Road Runner's' instructions.
- The Traffic Controller shall call up to stop the blasting sequence at any time if a breach of the road closure occurs.
- If a breach has occurred, the public road will require clearing again before recommencing blasting operations.

5.4 Possible hazards

- Potential dust and fumes impact
- Potential flyrock impact

5.5 Notification of appropriate parties

- Approval will be sought from Singleton Council to temporarily close roads for the purpose of blasting annually; also approval from RMS to temporarily close roads for the purpose of blasting will be sought every six months.
- MTW will also provide RMS a weekly plan of blasting road closures of the Golden Highway or Putty Road.
- Notice of temporary road closures will be provided via the posting of signs on the affected roads (Putty Road, Wallaby Scrub Road, Charlton Road, Golden Highway), where practical, 2 days prior to blasting. The signs will display the date and time of the next blast and a contact telephone number for public enquiries. Signs will comply with AS 1743-2001 Road Sign Specifications.

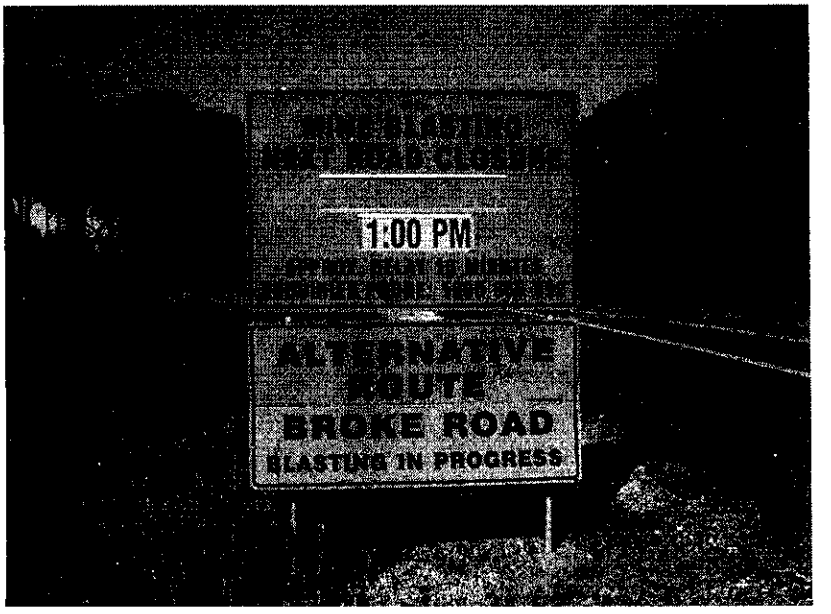

Figure 1: Example of permanent signage on Charlton Road

- Notification of forthcoming road closures will be provided to the local community through advertisements in the Singleton Argus. Advertisements in Tuesday's Argus for a Wednesday, Thursday,

Friday or Saturday blast and in Friday's Argus for a Monday or Tuesday blast.

- Singleton Council Operations Management will be notified by email prior to 12pm the day prior to a road closure after 10am.
- Daily updates of blasting times and road closure details will be available by calling the MTW Blasting Hotline on **1800 099 669.**
- In the unlikely event that a road closure will be more than 1 hour outside the window provided on the Blasting Hotline a SMS will be sent to residents who request this service. This SMS service is currently in development and will be trialled, implemented and refined during the next 12 months.
- MTW will communicate scheduled road closures with neighbouring mines so that road closures can be coordinated to minimise cumulative effects of several road closures.

5.6 Protocol for management of Emergency Services

In the event that emergency vehicles require clear and immediate access through (Putty Road, Wallaby Scrub Road, Charlton Road and Golden Highway) during a road closure, the Traffic Controller will immediately communicate with Shotfirer to ensure a safe thoroughfare is provided for emergency services vehicles. Where possible, and with the safety of all persons being maintained, blasting will be postponed until emergency services have passed safely.

5.7 Management of dust and fume

The positioning of Traffic Controllers will be dependent upon the prevailing weather conditions on a given day. The Traffic Controllers will be positioned at selected points to ensure the safety of all road users. The section of the blocked road shall be large enough to contain any potential passing dust and fume.

Following blasting, the decision to re-open the road will be made after a detailed visual inspection of the road conditions, including fume level monitoring (1ppm NO2 and 200ppm CO). In the event of slow dissipation of dust and/or fume the traffic controllers will ensure that the roadway remains closed. The road will be re-opened when the dust and/or fume have either

passed the blocked road or have sufficiently dispersed that they no longer present any risk to passing traffic.

5.8 Management of flyrock

Following blasting, the affected roads (Putty Road, Wallaby Scrub Road, Charlton Road and Golden Highway) will be visually inspected to determine whether any flyrock or other hazards are present.

In the event that flyrock has impacted upon the road, Traffic Controllers will

- Immediately notify the Blast Supervisor who will initiate a clean-up and repair response with removal of any rock.
- Traffic controllers will continue to keep roads closed and monitor road traffic until authorised to reopen the road by the Blast Supervisor

5.9 Evaluation and auditing / reporting procedures

5.9.1 Monitoring and Reporting

The effectiveness of road closures will be reported annually in the Mount Thorley Warkworth Annual Review, previously referred to as the Annual Environmental Management Report.

5.9.2 Audit/Review

This management plan is to be reviewed at least every three years or as otherwise directed by the Director-General of DP&I (Department of Planning and Infrastructure). The review process is to reflect changes in environmental legislation and guidelines, and changes in technology or operational procedures.

This management plan will be reviewed and revised if necessary, including where there are changes to the blast management plan as a result of changes in mine development.

This management plan has been originally prepared and submitted to the Singleton Council and the Roads and Maritime Services for consultation.

5.9.3 Revision Status

This management plan was prepared in consultation with Singleton Council and the Roads and Maritime Services. The final plan was sent to both parties for review on *4 June 2012;* please refer to Appendix 2 and 3.

6. REFERENCES

1. Project Approval 09_0202 Warkworth Mining Limited, Warkworth Extension Project, 3 February 2012.
2. Development Approval 34/95 Mount Thorley Operations, 2 May 2012
3. EMGA Mitchell McLennan, April 2010, *Proposed Warkworth Extension Environmental Assessment*

7. APPENDICES

Appendix 1 – MTW-10-WI-MINE-244-009 Closing Public Roads.

Appendix 2 - Copy of Letter sent to Singleton Council requesting a review of this plan.

Appendix 3 - Copy of Letter sent to Road and Marine Services requesting a review of this plan.

APPENDIX 1:

MTW-10-WI-MINE-244-009 Closing Public Roads

Closing Public Roads

IMPORTANT!

OUR GOLDEN RULES

1. NEVER WORK ON EQUIPMENT WITHOUT FIRST APPLYING YOUR PERSONAL LOCK(S) IN ACCORDANCE WITH ISOLATION PROCEDURES.
2. NEVER WORK ABOVE 1.8 METRES WITHOUT FALL PROTECTION OR FALL PREVENTION.
3. NEVER POSITION YOURSELF:
   - UNDER A SUSPENDED LOAD
   - WITHIN 10 METRES OF THE TOE OF HIGH-WALLS, LOW-WALLS OR OPERATING FACES WITHOUT FALLING OBJECT PROTECTION, UNLESS AUTHORISED TO DO SO.
4. NEVER APPROACH WITHIN 50 METRES OF "OPERATING" HEAVY EQUIPMENT IN A LIGHT VEHICLE OR ON FOOT WITHOUT MAKING POSITIVE CONTACT WITH THE OPERATOR.
5. NEVER PARK EQUIPMENT IN A MANNER THAT WILL ALLOW AN UNPLANNED MOVEMENT. ENSURE IT IS FUNDAMENTALLY STABLE.
6. NEVER WORK ON ELECTRICAL CIRCUITS ABOVE 32 VOLTS AC OR 110 VOLTS DC BEFORE "TESTING FOR VOLTAGE".
7. NEVER ENTER A CONFINED SPACE OR SPECIFIED RESTRICTED AREA UNLESS AUTHORISED TO DO SO.

TAKE FIVE STAY ALIVE!

5 STOP THINK IDENTIFY PLAN PROCEED

EVERY TASK

ZERO

First Priority Properties	
Keywords	Closing Public Roads
Automatic Notifications	Manager Mining, Superintendent Dragline Drill and Blast, Drill and Blast Engineers

REVISION HISTORY

Rev	Date	Revision Description	Name
5.1	27.06.2011	Reviewed – no changes	Jared Everett, Peter Baillie, Mark Caslick, Danny Peacock, Chad Hodgins, Alex Thompson, Brien Merrick, Phil Trees, Ian Upward, Dave Patton, Justin Burgess, Simon Brown
5	01.06.2010	Reviewed	Bill Arnold
4	10.11.2008	Added in special conditions for allowing access for emergency vehicles through a public road closure	Glenn Meyn, Frank Turnbull, Bill Arnold, John Hunter, Jared Everett
3	03.06.2008	Review – nil changes, added into new template	Bill Arnold, Peter Ballie, Ron Haddow, Trevor Bendrich, Mark Caslick, Simon Merrick, Jared Everett, Glenn Meyn, Peter Thompson, Chad Hodgins, David Judge, Kevin Trevathen, Brien Merrick
2	07.06.2007	Review	
1	22.02.2007	Initial	

1 PURPOSE

This Work Instruction provides the method for closing public roads for blasting at Mount Thorley Warkworth to minimise the risk of injury and/or equipment damage and to ensure compliance the conditions of the Road Closure Management Plan.

2 MAJOR HAZARDS

- Flyrock;
- Dust; and
- Interactions with public road traffic.

3 REQUIREMENTS

- Any public road within 500 m of a blast must be temporarily closed during blasting operations.
- Current Road Closure Management Plan approved by the Singleton Shire Council.
- Traffic controllers with current accreditation from the NSW Roads and Traffic Authority.
- Traffic controllers shall wear appropriate Personal Protective Clothing, including high visibility clothing.
- All mine vehicles used on public roads shall be road registered and clean – driver's are to be appropriately licensed for the vehicle they are driving.
- All blasting operations are to comply with MTW-10-WI-MINE-244-011 Firing a Shot.
- Additional requirements for Emergency Vehicles requiring access are set out at the end of this work instruction.

4 PROCEDURE

4.1 Drill and Blast Engineer

1 Determine if a road closure is required and ensure that all notifications have been made in accordance with the Road Closure Management Plan.

4.2 Shotfirer

2 Fire the blast as in MTW-10-WI-MINE-244-011 Firing a Shot.

- All internal sentries to be set prior to initiating the road closure to minimise the duration of the road closure.
- Whilst the Shotfirer-in-Charge is ultimately the accountable person for the blast, the 'Road Runner' is responsible for the operations on the public road itself.
- The Shotfirer-in-Charge must ensure that the 'Road Runner' understands the requirements for securing and clearing the public road.

4.3 Traffic Controller

3 Maintain line of positive communication with the 'Road Runner' and other Traffic Controllers at all times.

- The Traffic Controllers are effectively the face of the organisation – Traffic Controllers shall present themselves neatly at all times and remain courteous with the public.
- The Traffic Controllers shall ensure that they remain on the designated blasting channel for the blast.

4 Ensure that all signage is displayed in accordance with the Road Closure Management Plan.

- This requirement also includes the operation of flashing lights and detour signs in place.

5 Close and secure the public road in accordance with the 'Road Runner's' instructions.

- Remain vigilant at all times, and do not allow distractions to interfere with your duties.
- The Traffic Controller shall call up to stop the blasting sequence at any time if a breach of the road closure occurs.
- If a breach occurs, do not leave your position, but report as much detail of the offending vehicle as possible to the 'Road Runner'.
- If a breach has occurred, the public road will require clearing again before recommencing blasting operations.

6 Re-open the public road in accordance with the 'Road Runner's' instructions.

- Ensure all signage is removed or closed as appropriate.

4.4 Responsibilities of the 'Road Runner'

- The 'Road Runner' is an MTW employee who is charged with responsibility of ensuring the public road is secured and cleared in accordance with the Road Closure Management Plan.
- The 'Road Runner' acts as the point of contact between the Shotfirer-In-Charge and the Traffic Controllers.
- Maintain line of positive communication with the Traffic Controllers and the Shotfirer-in-Charge at all times.

7 Instruct the Traffic Controllers to close the road when directed by the Shotfirer-in-Charge.

8 Clear the public road between the Traffic Controllers in a systematic manner to ensure that the road is clear of people or vehicles at risk.

- Maintain contact with the Traffic Controllers to ensure that last vehicles leaving the secure area are identified and accounted for.

9 Notify the Shotfirer-in-Charge when the public road has been secured.

10 When the blast has been fired, observe the wind direction and request permission from the Shotfirer-In-Charge to check the road for re-opening.

11 When the road is inspected and deemed to be safe to travel on, request permission from the Shotfirer-in-Charge to re-open the road.

- Instruct the Traffic Controllers to re-open the road but maintain their positions until the 'All Clear' has been given by the Shotfirer-in-Charge.
- In the event where dust/fume/blast debris are covering the road, inform traffic controllers to maintain closure until notified by Road Runner even if the shotfirer has given an all clear until area is deemed safe by Road Runner.
- Report any breaches of the Road Closure Management Plan to the Superintendent Dragline, Drill and Blast.

5 SPECIAL CONDITIONS – EMERGENCY VEHICLES REQUIRING ACCESS

In the event that an Emergency Vehicle requires passage through a closed road, the 'Road Runner' shall ascertain the nature of the emergency and the number of emergency vehicles likely to require access.

The Shotfirer-In-Charge shall grant permission to re-open the road only on the condition that it is safe to do so and that that the 10 second blast warning has not yet occurred.

When given permission, the Traffic Controller shall open the road for all traffic and Emergency Vehicles to pass.

The 'Road Runner' shall notify the Shotfirer-In-Charge when all Emergency Vehicles have passed and the Shotfirer-In-Charge will call for the road to be re-closed when ready.

If the Shotfirer-In-Charge cannot safely allow passage, all endeavours must be undertaken to ensure that safe passage can be gained as quickly as possible.

APPENDIX 2:

Evidence of consultation with Singleton Council.

COAL & ALLIED

Managed by Rio Tinto Coal Australia

4 June 2012

General Manager

Singleton Council

PO Box 314

SINGLETON NSW 2330

Attention: Mr Mark Ilhein

Dear Madam

Warkworth Extension Project – Consultation for Road Closure Management Plan in Relation to Blasting (Schedule 3, Condition 20(d))

We refer to Schedule 3, condition 20(d) of the Warkworth Extension Project Approval which was granted by the Minister for Planning on 3 February 2012.

Under that condition, it is a requirement that we consult with Singleton Council in the preparation of a "*road closure management plan for blasting within 500 metres of a public road*".

We **enclose** a draft 'road closure management plan' for your consideration and comment.

On 18 June 2012 Coal & Allied will be submitting the draft plan to the Department of Planning and Infrastructure as an appendix to the 'Blast Management Plan' which we are also required to prepare and implement under Schedule 3, condition 20.

Would you please provide us with any comments Singleton Council may have on the draft plan by close of business on 15 June 2012.

Please note that this is not Mount Thorley Warkworth's official application for temporary road closures that is applied for annually, however, this Road Closure Management Plan will be included in the upcoming application.

Coal and Allied Operations Pty Ltd

ABN 16 000 023 656

Lemington Road, Ravensworth via Singleton NSW 2330 Australia

PO Box 315 Singleton NSW 2330 Australia

Telephone +61 2 6570 0300 Facsimile +61 2 6570 0399

Please contact us if you have any questions or require clarification on any component of the draft plan.

We look forward to hearing from you.

Yours sincerely

Mark Nolan
Manager Project Approvals NSW
Approvals, Environment and Land, Coal Australia

PO Box 315 Singleton 2330
T: +61 (0) 2 65700 301 M: +61 (0)428 885 301
mark.nolan2@riotinto.com http://www.riotintocoalaustralia.com.au

encl: draft 'road closure management plan'

From: Ihlein, Mark
To: Proctor, Nicola (RTCA)
Subject: RE: MTW Road Closure Management Plan
Date: Monday, 18 June 2012 9:22:58 AM

Hi Nicola,

The Plan has been received and we have no specific comments.

Regards

Mark Ihlein
Director Planning & Regulated Services
Singleton Council
Phone: (02) 65 787 330
Mobile: 0429 994 112
Email: mihlein@singleton.nsw.gov.au

From: Proctor, Nicola (RTCA) [mailto:Nicola.Proctor@riotinto.com]
Sent: Monday, 18 June 2012 9:04 AM
To: Ihlein, Mark
Subject: MTW Road Closure Management Plan

Hi Mark,

I am writing to you to confirm you have received the Mount Thorley Warkworth Road Closure Management Plan that was sent to you on 4 June, and that no further consultation is required.

Feel free to contact me if you have any questions.

Regards,

Nicola Proctor
Co-ordinator – Project Approvals, NSW
Environment and Land Strategic Development- Coal Australia

Rio Tinto
Hunter Valley Services – PO Box 315 Singleton NSW 2330 Australia

M: +61 (0)467 744 356
Nicola.Proctor@riotinto.com
http://www.riotintocoalaustralia.com.au

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APPENDIX 3:

Evidence of consultation with Roads and Marine Services.

COAL & ALLIED

Managed by Rio Tinto Coal Australia

4 June 2012

David Young

Land Use Development Impacts

Roads and Maritime Services

Locked Bag 30

NEWCASTLE NSW 2300

Dear Mr Young

Warkworth Extension Project – Consultation for Road Closure Management Plan in Relation to Blasting (Schedule 3, Condition 20(d))

We refer to Schedule 3, condition 20(d) of the Warkworth Extension Project Approval which was granted by the Minister for Planning on 3 February 2012.

Under that condition, it is a requirement that we consult with Roads and Maritime Services in the preparation of a "*road closure management plan for blasting within 500 metres of a public road*".

We **enclose** a draft 'road closure management plan' for your consideration and comment.

On 18 June 2012 Coal & Allied will be submitting the draft plan to the Department of Planning and Infrastructure as an appendix to the 'Blast Management Plan' which we are also required to prepare and implement under Schedule 3, condition 20.

Would you please provide us with any comments Roads and Maritime Services may have on the draft plan by close of business on 15 June 2012.

Please contact us if you have any questions or require clarification on any component of the draft plan.

We look forward to hearing from you.

Coal and Allied Operations Pty Ltd

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Yours sincerely

Mark Nolan
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encl: draft 'road closure management plan'

From: YOUNG David N
To: Proctor, Nicola (RTCA)
Subject: RE: MTW Road Closure Management Plan
Date: Friday, 20 July 2012 3:49:32 PM

Nicola

As discussed, RMS would be satisfied if you submitted the plans on time under the current arrangements. RMS would advise if there are issues.

Kind regards

Dave Young
Manager, Land Use Development
Hunter Region
T 02 4924 0688 **F** 02 4924 0342 **M** 0457 885 631
www.rmservices.nsw.gov.au

Roads and Maritime Services
59 Darby Newcastle NSW 2300 /
Locked Bag 30 Newcastle 2300

From: Proctor, Nicola (RTCA) [mailto:Nicola.Proctor@riotinto.com]
Sent: Friday, 20 July 2012 3:38 PM
To: YOUNG David N
Cc: Nolan, Mark (RTCA)
Subject: MTW Road Closure Management Plan

Hi David,

Thank you for the advice in the attached letter. We will incorporate the two comments into our Road Closure Management Plan, which will be submitted as an appendix to the final Blast Management Plan to Department of Planning and Infrastructure by the end of September 2012.

Please do not hesitate to contact me if you have any questions.

Regards,

Nicola Proctor
Co-ordinator – Project Approvals, NSW
Environment and Land Strategic Development- Coal Australia

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Thomas Lewandowski
B.E. (Mining), M.M.Mgt.
M.Aus.I.M.M., M.I.S.E.E.,
M.EFEE.

MOUNT THORLEY WARKWORTH

BLAST IMPACT ASSESSMENT OF THE WARKWORTH EXTENSION PROJECT ON ABORIGINAL GRINDING GROOVE SITES

REPORT NO. MT-1238-270612

Thomas Lewandowski
27th June 2012

Appendix C - Blast Impact Assessment of the Warkworth Extension Project on Aboriginal Grinding Groove Sites

MOUNT THORLEY WARKWORTH

BLAST IMPACT ASSESSMENT OF THE WARKWORTH EXTENSION PROJECT ON ABORIGINAL GRINDING GROOVE SITES

REPORT NO. MT-1238-270612

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MOUNT THORLEY WARKWORTH

BLAST IMPACT ASSESSMENT OF THE WARKWORTH EXTENSION PROJECT ON ABORIGINAL GRINDING GROOVE SITES

REPORT NO. MT-1238-270612

1. INTRODUCTION

Enviro Strata Consulting was requested by Mount Thorley Warkworth to undertake an independent assessment of the Warkworth Extension project and its impact on the selected Aboriginal grinding groove sites located in the approved (3 February 2012) development consent boundary. The Aboriginal grinding groove sites of concern include sites M37 East and West, MTW266, MTW267 and MTW268.

Some of the Aboriginal grinding groove sites are located within the extraction area and therefore will require re-location at some point in time. The other Aboriginal grinding groove sites are located some distance away from the approved Warkworth Extension area.

The report addresses the following issues:

- Estimation of potential vibration exposure for the grinding grooves area
- Risks associated with blast exposure for the grindings grooves areas
- Estimation of optimal removal time for the grinding grooves that need to be re-located
- Recommendations for risk mitigation

The report is based on details provided by Mount Thorley Warkworth (MTW), including blasting plans and blasting details, related consultants reports and a site visit undertaken on the 13.04.12 by the author and the Coal and Allied personnel.

The study assesses the risks related to blasting operations for inclusion in the Blast Management Plan.

2. PROJECT METHODOLOGY

There are many Aboriginal archaeological features in MTW's approved Warkworth Extension, refer to **Figures 1A-B** showing the mine's progression in year 9 and 21, as based in the Environmental assessment (EMGA Mitchell McLennan, 2010). The archaeological / geological surveys undertaken during assessment of the Warkworth Extension revealed a number of aboriginal artefacts present within the boundaries of the extraction area as well as on the adjacent land.

The following project methodology has been used to ensure the accuracy of the assessment, and based on the following:

- The site assessment undertaken on the 13.04.12 which included rock testing and a visual inspection of the rock strata conditions
- Revision of the existing reports and available relevant information
- Vibration modelling to assess the potential impact of vibrations and flyrock on rock strata conditions. This modelling is based on the proposed mining plans and supplied blast details.

Also referenced are the author's experience and overseas studies related to blast exposure of various rock strata and similar issues with artefacts and delicate stalactites.

This report addresses Condition 12 b) and c) from Schedule 3 of the Project Approval PA09_0202, granted 3 February 2012, utilising the provided blast design details, proposed mining plans and assessment of the state of the Aboriginal grinding groove sites. The findings of this report will be incorporated into the MTW Blast Management Plan.

3. SITES DESCRIPTIONS

A site inspection was undertaken on the 13.04.12 involved a number of people, representing Enviro Strata Consulting, Coal and Allied's Project Approvals and Coal and Allied's Cultural Heritage.

The visit included a site inspection, a detailed examination of the Aboriginal grinding groove sites, a photo session and rock site testing. The inspection included 5 distinctive sites as described below.

- Site M37 (West)
- Site M38 (East)
- Site MTW-266
- Site MTW-267
- Site MTW-268

The locations of the sites visited and the current mining operations of MTW are highlighted in **Figures 2A-B**.

The grinding grooves provide historical evidence about the Aboriginal people's activities. As indicated in the information provided by the Queensland's Department of Environment and Resource Management the grinding grooves present evidence of either tool making or food processing activities. Generally, the grinding grooves were formed by manual handling of stones mainly rubbing against the flat part of softer rocks. These activities were conducted against sandstone rocks near a water source such as creeks, water holes, etc. The water in this case provided lubricant. As a result of such activities, generally a series of long, narrow and oblong grooves can be observed on the sandstone slab.

Site M37 (West)

The inspected area included outcrop formations of sandstone underlined by conglomerate formations. The grinding grooves were located in the competent sandstone formation. The estimated overall block dimensions were in the order of 12.5 metres long by 7.7 metres wide, see **Appendix 1**.

As indicated in the Strata Control Technology (SCT Report (2010)), in the past the area was part of an old river formation, however, this is no longer the case. For a schematic representation of the site refer to **Figure 3**.

The other observations include the absence of any signs of negative impact from current or previous blasting activities. Generally there were no signs of rock crumbling or loose pieces of rock lying in the proximity of the grinding grooves which would be associated with ground vibration or a rock shaking action, see **Appendix 1.** This indicates that current and past blasting activities generated relatively low vibration levels, and were insufficient to induce any damage to the analysed rock strata.

This grinding groove site will be relocated ahead of mining, it is anticipated this will be in the next two years.

Site M37 (East)

The second site visited included Site M37 (East) see **Appendix 2**. Unfortunately, the grinding grooves in this area could not be located due to overgrown vegetation. It could however be noted that the SCT Report (2010) provided a relatively good description of the area.

For the schematic (inferred) location of the grinding grooves from Site M37 (East) refer to **Figure 4**. Similarly to M37 West, the grinding grooves area was limited to a sandstone layer. The sandstone layer was overlying a conglomerate strata directly underneath.

This grinding groove site will be relocated ahead of mining, it is anticipated this will be in the next two years.

Sites 266 and 267

The initial overview of grinding groove sites MTW 266 and 267 revealed that they are rather unusual cases as the identified grinding groove areas are located close to creek beds or other water sources, see **Appendices 3-4**. However, as observed during the site inspection, these two sites do not appear to be located off the inferred water courses and / or water sources. These sites are located on almost flat ground and located a few hundred metres away from the river leg (i.e. existing lagoon) formed by the branch of the river.

The observed groove sites appear as protruding rocks. Due to the presence of soil and vegetation it is unclear if these groove sites are on the same rock slab or are located on a number of different rock slab formations. The indentations of the grinding groove sites are not as pronounced as Site M37 West, however they are still visible. The protruding sandstone rock formation appears to be affected by the presence of moss. Also, the rocks appear to be of lesser strength than the rocks at Site M37. It should be added that both sites are a considerable distance from the Warkworth Mine Extension.

Site 268

Site MTW 268 is located right on the edge of the existing river leg / lagoon, see **Appendix 5**. The main indentation of the grinding groove site is in a sandstone boulder. A smaller adjacent sandstone block also has some grinding groove indentations.

As in the previous case, the strength of the rock appears to be lower than the strength of the rock identified for site M37. As above this site will be a considerable distance from the mine extension.

4. ROCK STRATA ASSESSMENT

The rock strata formations were tested using visual assessment, Schmidt Hammer testing and tap test assessment methods.

Site M37 (West)

The sandstone material (where the grinding grooves are located) appears to be moderately strong and relatively uniform. To provide some indication about rock strength, uniaxial compressive strength (UCS) measurements were undertaken by ESC's engineer using the Schmidt Hammer; it is to be noted that this is a non-destructive test. The results are summarised in **Table 1**. These numbers can be compared to typical sandstone values of 20 – 30 MPa which are usually measured for sandstone strata in the Hunter Valley area. Although, lower strength sandstone can also be found.

The whole section appears to be of reasonable strength, especially the mid-section of the area of concern, where the grinding grooves are located. The results of the Schmidt Hammer testing revealed relatively competent material with the estimated average strength of the rock strata in the order of 28 MPa, see **Table 1**. The range of measurements at Site M37 West varied between 14 and 40 MPa.

The other consideration is the presence of weaknesses such as joints and faults. Based on the site observation, there is one major joint present, as indicated in **Figure 3**.

It should be noted that blast damage could be caused to the grinding grooves due to breakage of the rock strata. This is usually dictated by the strength of the rock itself. The other possible mechanism could be result of the presence of weakness in the rock strata such as the high density of jointing and / or the presence of a major geological fault or a series of faults. Such jointing or faulting, when exposed to vibrations, could undergo further rock strata movement and during the vibration process could cause movement, resulting in spalling and damage to the presented archaeological artefacts.

Based on the site observation and the presence of one joint (located away from the identified grinding grooves), the possibility of damage is highly unlikely. Basically, any movement along this joint should not affect the adjacent rock strata where the grinding grooves are located. Also, the observed joint is a tight type, therefore, the movement for this type of joint will require higher levels of vibration than, for example, an open type joint.

The observed points of weakness were identified on the edge of the sandstone block and at the convergence of the sandstone and underlying conglomerate.

It should also be added that the strength of the rocks varies, especially on the edge of the assessed formation (i.e. some distance away from the grinding grooves). In this particular case, the edge of the sandstone produces lower strength results and the occasional drummy sound indicating an existing weak strata layer.

Site M37 (East)

The rock strength assessment of this area, including the Schmidt Hammer testing, is provided in **Table 1**. The assessment revealed a relatively competent material. The estimated strength values ranged from 16 to 39 MPa, with an average estimated strength in the order of 24 MPa. As in the first case, moderately strong rock conditions were observed and confirmed by the Schmidt Hammer testing. It is inferred that the grooved site area has similar rock strength values, despite the fact that the actual grinding groove area could not be clearly located.

The rock strata underneath the sandstone is conglomerate (as in the first case). The hollow sound, indicating potential strata weaknesses, was only detected in two sections as marked in **Table 1,** and these were detected on the edge of the tested area.

In terms of geological weaknesses, no significant jointing / faulting was observed in the second site. Moderately strong conditions for the rock strata can be concluded for this area.

Although the groove sites were overgrown by the vegetation, it is inferred this section needs to be exposed to substantial levels of vibrations before any damage can occur. This is based on the assumption that the rock strata layers where the grinding grooves are located exhibit the same strength as the adjacent tested rock layer.

In summary, Sites M37 East and West revealed similar geological and geotechnical characteristics. Based on strength values, it can be concluded that a substantial vibration exposure is needed to cause damage (i.e. a simple comparison of the assessed sandstone strata (24 - 28 MPA average) to comparable material such as concrete (i.e. typical 25 – 30 MPa strength value).

Table 1 – Summary of Rock Strength Results Using Non Destructive Schmidt Hammer Test

Infrastructure / Tested Section	Measured UCS (MPa)	Estimated Average UCS (MPa)	Comments
Site M37-West			
Sandstone	25.5, 27.6, 39.6, 14.5 36.2, 32.8, 22.1, 27.6 29.0, 25.5, 25.5	**28**	Sandstone section – good solid rock conditions
Underlying conglomerate	<10*, 30.3, <10*, 30.3 <10*, <10*		Difficult to measure / unreliable readings / lack of flat surface
Weathered material – northern section	<10*, <10*, <10* <10*, <10*	**<10***	Weathered rock, weak material, also hollow sound detected i.e. thin layer
Site M37-East			
Sandstone	27.6, 22.1, 36.2, 39.6 18.3, 16.2, 19.3, 19.3 36.2, 30.3, 25.5, 22.1 18.3, 29.0	**24**	Generally competent material observed across the whole area. Two places with hollow sound detected – marked in green
	<10.3, <10.3		Weathered rock – on the edges of the tested area
Site MTW 266 (Site of 6 grinding grooves)			
Outcropping rocks	<10*, <10*, <10* 19.3, <10*		
Site MTW 267			
Site of 6 grinding groves	<10*, <10*, 10.3, 12.4, 10.3, 10.3 10.3, 14.5 10.3, 10.3 10.3, 10.3, 10.3, 10.3 10.3, 10.3		
Site MTW 268			
	<10*, <10*, <10 *<10*, <10*, 14.5		Top weathered

* Below instrumentation capability but still a valid estimation

Note: Rebound value 20 = 10.3 MPa (instrument limitation)

SITE M37

In summary, the assessed rock formations do not appear to be detached from the conglomerate strata below. Generally a firm bond was observed. There was a lack of a slippery surface observed. Therefore, substantial forces would need to be present to detach both layers (sandstone and conglomerate). For this type of strata configuration, low vibration levels are insignificant and not likely to cause damage. This grinding groove site will be relocated ahead of mining, it is anticipated this will be in the next two years.

The assessed rock strata appear to be affected by the presence of only one major joint, which is a tight joint type. The rock strata unit where the grinding grooves are observed form one single compact unit, without the presence of significant amounts of weaknesses, which could undergo damage during blast exposure. Also, no small detached blocks in the vicinity of the grinding grooves were observed. Therefore, there is no reason to suspect a potential weakness exists.

In summary, it is the author's opinion that the risks related to the potential impact from blasting and damage to the rock strata are extremely low. To further ensure the grooves remain intact site monitoring may be implemented. The options include displacement measurements of the described joint. This option would involve the installation of a permanent dial gauge indicator with resolution of 0.01 mm or 0.001 mm as well as periodic inspections and measurements. Alternatively, a ground vibration monitoring unit can be installed. These precautionary measures are not necessary at this stage and can occur at a later stage when, for example, blasting approaches within a 500 metre radius of Site M37.

Sites 266, 267, 268

The outcropping rocks occur in a number of places. The quality of the rocks can be described as low/medium strength, see **Table 1**. In view of a substantial distance from the proposed pit there will be no risks from blasting. In this case, the distance alone will provide a sufficient buffer.

5. REVIEW OF RISKS

There are four typical categories of risk related to blasting activities in the proximity of Aboriginal artefacts and historical items. These include:

- Flyrock
- Fumes
- Ground vibration
- Air vibrations

For the considered artefacts, only two risks are applicable; flyrock and ground vibrations.

Some of these risks will be minimal or completely eliminated due to the substantial distance from the blasting area. In those cases, there is no need to go into great detail in this report. Some of the risks will change with time, especially as blasting progresses towards these specific artefact sites. The risks will be substantially lower when blasting is undertaken 500 metres away compared to those risks when blasting is undertaken 150 metres away. When assessing the risks generated by blasting, there are two important factors. These are:

- Distance from the blasting area
- Maximum instantaneous charge (MIC)

The locations of the points of interest are presented in **Figures 2A-B**. The estimated distances between the blasting area and these points of interest are presented in **Table 2**.

For those sites which will be moved prior to mining to prevent damage, the timing of that removal is the main consideration.

Table 2: Distance Estimation Snapshots for year 9 and 21

No.	Infrastructure	Year 9 - Distance (m)	Year 21 - Distance (m)
1	Site M37 West	455	Relocated
2	Site M37 – East	295	Relocated
3	Site MTW 266	3340	2160
4	Site MTW – 267	3375	2150
5	Site MTW – 268	3360	2140

Typically, when dealing with moderate or high levels of ground vibrations, it is necessary to assess in detail the strength and quality of the points of interest (i.e. relevant rock strata conditions). That way, the potential response of the point of interest to the induced ground vibrations will be understood.

When dealing with low levels of ground vibrations however, a detailed assessment is not required. Rock strata of a low / medium strength would not undergo damage when exposed to low levels of ground vibration.

For sites 266,267 & 268 detailed analysis is not required. For the points of interest located closer to the blasting area however, a more detailed assessment is needed.

Based on the author's experience, for points of interest located greater than 500m, the impact of blasting should be of no major concern.

6. VIBRATION MODELLING

This section provides indicative vibration levels for the aboriginal artefacts.

Vibration modelling is undertaken to ascertain:

- Estimation of vibration exposure before damage will occur at the grinding grooves which are identified in Condition 12 b), of Schedule 3 of the Project Approval which are to remain in situ;
- Estimation of vibration exposure before damage will occur at the grinding grooves which are identified in Condition 12 c), of Schedule 3 of the Project Approval which will be relocated ahead of mining.

To provide an indication about the potential impact of the Warkworth Extension on the adjacent area, including the above described Aboriginal grooves and other points of interest, vibration modelling was undertaken. The vibration predictive model used in this report is based on the previously compiled model generated for MTW in 2000. This model is based on the vibration monitoring stations located in the vicinity of Bulga village; therefore, considered to be representative for the area of interest.

The model is based on the actual surface vibration measurements from various MTW blasts, and details were presented in the internal report (Terrock's Report 2000). The parameters summarising the site law analysis (governing ground vibration behaviour) are specified as follows:

$$V = 1720 \left(\frac{D}{\sqrt{m}} \right)^{a}$$

Where:

V	=	Peak Particle Velocity (mm/s)
D	=	Distance from blast (m)
m	=	Charge mass per delay (kg)
a	=	Site exponent (-1.6)

It should be noted that the assessment is based on the outer data envelope, therefore implying the "worst case scenario" (i.e. based on the highest measured value).

Also, as indicated in the previous sections, Site M37 (East and West) is scheduled to be re-located, ahead of mining. This site warrants investigation regarding the proximity of blasting, without major negative impact on the site. Therefore, the option of different modelling scenarios can be undertaken when detailed mining plans are available. Year 9 and 21 mine plans were supplied for course modelling providing an indication of vibration exposure and a potential timeframe when Site M37 could be relocated.

To undertake vibration modelling, proposed bench sizes were reviewed. This is to obtain an indication in regards to the thickness of the blasted material. This data, including maximum bench heights, is presented in **Table 3**. As can be observed, there is substantial variability in the bench heights. Therefore three different bench heights were chosen, these were: 20, 40 and 62 metres. It should be noted that 62 metres represents the maximum bench height and as such this should provide the maximum charge mass for all considered cases.

A variety of blasting products are used on site, for the purpose of modelling, only two products were modelled; ANFO which is used in dry conditions and Heavy ANFO which is used in wet conditions. These products are of different densities, which produces different charge masses, even for the same hole sizes. Therefore, for the three bench sizes two different products have been analysed. Therefore, six different options have been considered.

Table 3: Maximum Overburden / Interburden Thickness for the North Pit

Seam	Overburden / Interburden Thickness (m)			
	STRIPS (40 – 70)			
	40	50	60	70
WYC				12
WYD				14
WYE	25	16	-	
WYF	28	24	23	45
WYG	3	4	3*	3
RCA	30	25	5	8
RCB			12	21
RCC	17	5	5	41
RCD	15		3	2
RCE	12	16	13	12
RCD	15		3	
RCE	12	16	13	
RCF	2	-	2	2
WBA	31	26	21	20
WBB	1	1	2	3
WBC	1.8	-	-	
WNA	26	-	-	
WNB	-	27	30	30
WNC	-	1	3	4
WND	3	4	4	4
BLA	3	3	2	2
BLC	0	1	1	2
BLE	16	26	29	28
BLF				1
BLG				1
BLH	4	3	2	3
GMB	41	40	39	42

Seam	Overburden / Interburden Thickness (m)			
	STRIPS (40 – 70)			
	40	**50**	**60**	**70**
GMC	15	13	32	10
GMD	6	4	2	2
WHA	6	7	8	10
WHE	-	3	2	
WHF	29	31	26	20
WHG	-	1	1	
WHH	3	2	2	2
WHJ	-	-	1	1
BFB	58	62	59	58
BFJ	-	-	1	1
WWA	6	6	6	6
WWE	39	32	18	21
WWF	2	1	1	2
WWG	1	1	1	2

The results of the modelling are presented as a series of overlying contour lines on the proposed mining plans. The vibration modelling for the year 9 plans is presented in **Figures 5A-F.** The vibration modelling for the year 21 plans is shown in **Figures 6A-F.** The vibration modelling provides potential vibration exposure for the aforementioned grinding grooves and are marked in on **Figures 5A-F** and **6A-F**.

It is important to note that the contour lines represent the extreme cases, i.e. initiation of the maximum charge mass (three different cases) from the edge of the pit shell in each case (i.e. for year 9 and 21). In this instance, each contour is drawn from the edge of the final pit shell. The ground vibration analysis is presented as a series of contour lines overlying the area (see **Figures 5A-F** and **6A-F**). Note that up to 7 main contours of interest were drawn for each case, including the following vibration values 0.6, 0.8, 1, 1.5, 2 -5, 10, 15, 20, 25, 35, 50, 70, 100 and 140 mm/s.

The results of the vibration modelling are summarised in **Table 4**. The table shows the maximum predicted vibration for each of the grinding groove site, depending on the bench size and blasting product used.

It should be noted that below is an approximation and the results given as per the output of the modelling.

Table 4: Maximum Ground Vibration Estimates for Each Point of Interest

Infrastructure	Min. Distance (m)	Estimated Max Ground Vibration (mm/s)					
		15 m Bench		40 m Bench		62 m Bench	
		ANFO 481 kg	Heavy ANFO 722 kg	ANFO 1626 kg	Heavy ANFO 2439 kg	ANFO 2565 kg	Heavy ANFO 3848 kg
Year 9							
To be relocated							
Site M37-West	455	13	19	36	49	51	71
Site M37-East	295	27	37	71	99	103	142
No relocation							
Site MTW-266	3340	1	1	2	2	2	3
Site MTW-267	3375	1	1	1	2	2	3
Site MTW-268.	3360	1	1	2	2	2	3
Year 21							
To be relocated							
Site M37-West	N/A	Relocated					
Site M37-East	N/A	Relocated					
No relocation							
Site MTW-266	2160	1	2	3	4	4	6
Site MTW-267	2150	1	2	3	4	4	6
Site MTW-268	2140	1	2	3	4	4	6

The result of the vibration modelling can be summarised as follows:

- Low vibration levels estimated for Sites 266, 267 and 268 for year 9 (i.e. predicted vibration levels in the order of 0.5 2.9 mm/s) and for year 21 (i.e. predicted vibration levels in the order of 1.1 6.0 mm/s). Even considering the highest bench size the inferred vibration exposure for these sites is considered low.
- Moderate / high vibration levels predicted for Sites M37 East and West (in the order of 13-142 mm/s, depending on the bench size) for year 9 which is considered as a pre-relocation stage.
- The modelling is extremely conservative and provides the worst case scenario. In reality, as the mine progresses to the west smaller explosive charges (i.e. deck charges) or smaller bench sizes will be necessary. This is to reduce the charge mass and therefore minimise vibration impacts on the surrounding environment. Otherwise, the mine would risk exceeding the 5 mm/s vibration limit imposed for

the Bulga village residences. As such, the use of a 62 metre bench size (as modelled here) is highly unlikely to be used as it will exceed current Project Approval criteria. However, this option (i.e. use of high benches) is still considered in this report.

7. FLYROCK IMPACT ASSESSMENT

As mentioned above, the flyrock issue is another potential hazard that should be addressed, especially when considering blasting in the proximity of Site M37. The main controlling parameter is the distance between the blasting area and the grinding groove sites. The typical range of flyrock is less than 500 metres. This is commonly used as an exclusion zone for open cut mines and applies to the MTW. Based on the author's experience flyrock is likely to occur within a 50 to 200 metre radius, In addition, small portions of flyrock will be limited to a 200 300 metre distance, and only occasional pieces will extend beyond a 300 metre radius. It is expected that the potential for flyrock will be likely when blasting is conducted within a 300 metre radius of the grinding grooves. The possibility of flyrock from further distances (i.e. than the discussed 300 metres) is rather unlikely; (see **Figure 7A**). Nevertheless, this issue cannot be excluded.

The author's observations are in general agreement with other authors' studies (Davies 1995 - refer to **Figure 7B)** which summarise reported flyrock distances from the United Kingdom and Hong Kong. Please note that the data summary is based on reportable incidents only, and therefore should be treated with caution as it represents a rather skewed sample. Nevertheless, similar findings to that described above have been obtained.

Obviously, the mitigating, underlying assumption in this matter is that an appropriate blast management plan for MTW is in place. This should also include an appropriate blasting practice such as the use of suitable stemming material, product loading, quality checks, etc.

Also, it should be said that as the pit progresses to the West (closer to Site M37), the probability of flyrock increases. On a positive note, the pit walls (between the blasting operation and Site M37) will form an additional barrier which will aide in the prevention of flyrocks as mentioned above by other author's modelling.

The other important parameter is the possible trajectory of flyrock. This can vary depending on energy release and deficiency in the rock strata / stemming column (for confined type shots). The indicative flyrock trajectories are presented in **Figure 7C**. As shown, this applies to flyrock trajectories for flat ground only. However, in the presence of pit walls, significant numbers of flyrock will be blocked and therefore some of the predicted flyrocks will not achieve the target at all, refer to **Figure 7D**. The presented example shows modelling of 100 flyrock trajectories using mean velocity and

take-off angles of 120 m/s and 45 degrees respectively. A standard deviation of 40 m/s and 20 degrees was used in the model to improve its accuracy.

In summary, based on the author's experience and also confirmed by other author's the more likely scenario is for flyrock to occur within a 50 to 200 metre radius, i.e. highest percentage. In addition, small portions of flyrock will be limited to 200 – 300 metres distance, and only occasional pieces may extend beyond a 300 metre radius. The described distribution would apply to the majority of cases. Therefore, based on probability, it can be expected that any potential flyrock, in the case of the Warkworth Extension, will be highly likely when blasting is within a 300 metre radius.

The current blasting practice at MTW includes the application of a 270 mm hole diameter, with appropriate stemming material. The column height currently used by MTW generally varies between 4.5 metres and 6 metres. The mine utilises best loading practice including loading sheets, etc. Nevertheless, considering the high number of blasts, the possibility of human error and possible adverse geology, the potential for the generation of flyrock cannot be excluded. Therefore, Site M37 could potentially be exposed to flyrock impact and as such the application of a hard barrier to protect the grinding grooves should be considered. It must be noted that site M37 will be relocated ahead of mining, it is anticipated this will be in the next two years. In the event that relocation is delayed flyrock protection should be considered when blasting is within 500 meters of the site.

8. COMPARABLE STUDIES

Few different relevant studies are quoted below. This is to provide a relevant comparison to the potential vibration exposure and effect on the analysed grinding grooves. The presented short summaries range from studies on stalactites and middens (representing very soft formations i.e. a lower end of the scale) through to studies on sandstone and concrete (directly comparable to grinding grooves).

Midden Mounds – Indian Artefacts (Oriard 2005)

In Monterey, USA blasting of a long narrow slice off an outcrop for road works was undertaken near Indian middens containing solid items in the form of organic deposits and stone artefacts.

To meet public concerns blasting was to conform to the accepted standard for residences – 50mm /s. No damage was claimed or observed during the work.

Stalactites – Old Tunnel / Soda Straws Case No. 1 – (Oriard 2005)

The project included blasting for a highway cutting near an old masonry-lined railway tunnel which had been replaced by a concrete-lined tunnel.

The closest blasting took place at a distance of 27 m to the concrete lined tunnel. Vibrations were kept to 25 mm/s vibration limit. Following the blasting, no damage was detected in the old masonry lined tunnel, which also contained some delicate soda straw stalactites suspended from the tunnel arch. The stalactites were up to 0.76 m in length and 4.8 mm in diameter at the base. None of these stalactites fell even when vibrations reached 19 mm/s.

Stalactites – Case No. 2 (Oriard 2005)

Blasting operations were needed to develop tourist facilities at Kartchner Caverns in Arizona in August 1999. The caverns are wet live caves.

Test blasting, covered distances ranging from 3 to 24 m. Some vibrations were monitored on the ground surface, others underground. One or more sensitive soda straws fell at 15 mm/s but no further straws fell as velocity increased to 50 mm/s. It is common for the loosest particles to fall at a low level vibration, then no more to fall.

Vibrations were recorded on three portable seismographs. The vibration data remained within the full bounds of the prediction curves. Careful monitoring and control saw the job completed successfully.

Concrete cracking from vibrations

Oriard (1998) believes vibration limits are not appropriate for mass concrete.

No damage was observed on test blocks when subjected to 3 in/s (76.2 mm/s) of vibration twice a day from the time of pouring and 17 to 70 in/s (1778 mm/s) at three days and 100 in/s (2540 mm/s) at eight days.

Only some spalling of poorly bonded grout and a previously deteriorated surface were evident at 100 in/s (2540 mm/s).

For a free standing walls initial cracking appears to occur at 6 to 11 in/s (279.4mm/s) (RI 8507) and (RI8896). Cases of foundation cracks were likely caused by static failure.

Worldwide studies found driveways and slabs in contact with the ground did not crack, including those achieving vibrations of 5 to 10 in/s (254 mm/s).

Lewandowski et al 2006

The study included a comprehensive investigation of roof strata exposed to adjacent open cut blasting located as close as 140 metres from the underground mine. The details of the study are included in Lewandowski et al 2006. The study led to the development of a detailed blast management plan, including the introduction of a safe vibration limit for rock strata conditions (estimated as approximately 250 mm/s) for this particular mine and a human comfort level (estimated as 10 mm/s) for personnel withdrawal. The detailed underground study revealed a satisfactory rock strata performance for vibration

levels up to 96 mm/s. The immediate roof consisted of a coal strata layer (strength values of 12 - 21 MPa) as well as sandstone /siltstone/claystone roof (strength values of 25 - 110 MPa) It is stressed that the above-mentioned 10 mm/s was used as a human comfort level and not strata damage level.

Lewandowski and Cope 2009

The study entailed a detailed investigation of infrastructure and rock strata exposed to high vibration levels up to 250 mm/s, without negative impact on infrastructure and surface strata layers. The study also revealed the presence of the immediate blasting zone – the area where there is a high probability of damage occurrence. The extent of this zone is relatively limited and is dependent on the type of the blast, presence of pre-split and other factors. This particular study revealed strata damage up to 17 metres from the blasting edge (charge mass of 600 kg). The vibration level exposure in this zone was estimated to be in excess of 500 mm/s.

Lewandowski et al 1999

The study included detailed investigation of a sandstone roof response to adjacent open cut blasting. The sandstone roof of an underground mine was exposed to high vibration levels from adjacent open cut blasting. The strength of the analysed sandstone roof was in the order of 24 MPa. The underground mine was exposed to high vibration levels (with high frequencies generated) without negative impact on the roof stability. The study concluded that the theoretical vibration limit for this type of roof was in the order of 300 mm/s.

Coincidentally both mines including Bulga Open Cut and South Bulga Underground are located within 10 km radius of the investigated grinding grooves. The rock strength values for the analysed MTW grinding grooves and South Bulga Underground roof are very similar.

In summary from ESC's experience, vibrations in the order of 250 - 300 mm/s (assuming high frequencies are generated) are generally insufficient to cause damage to rock strata such as the considered sandstone material of the estimated strength of 24 – 28 MPa. The inferred vibration damage level for the considered sandstone material (including grinding grooves) is estimated to be 300 mm/s.

9. PROPOSED APPROACH

9.1 Approach for Grinding Grooves which are to be Relocated

The undertaken assessment for Site M37 revealed quite a robust underlying material present (Site M) where the grinding grooves are located. The sandstone material has been assessed and it revealed that the strength of the considered rock is in the order of 24 – 28 MPa. This is quite comparable to concrete material (i.e. typical strength of concrete is in the order of 25 – 30 MPa). A parallel study on concrete damage revealed that a substantial level of vibration needs to be induced to cause concrete damage (i.e. few hundred mm/s needed). Similar levels would be needed for rock strata damage to occur.

In view of the assessed rock competency and rock strength there are no major risks of damage for the assessed rock strata (including Site M37).

When considering the impacts of blasting on strong material, theoretically, there are no significant risks related to the possibility of damage to the grinding grooves. Taking into consideration such a strong rock strata, close blasting activities are a possibility.

The other risk, such as the possibility of flyrock damage, is also theoretically low. Nevertheless, it should be said that occasionally flyrock could occur for a number of reasons, such as:

- Human error during loading
- Unpredictable geology of the area, which could contribute to weaknesses around the face or around the stemming column area
- Bridging of the stemming material during loading of the stemming material

Therefore, even remote possibilities should be taken into consideration when dealing with exposure to blasting. In the author's opinion the grinding grooves can be removed at a later stage of the project. This is due to the detected, moderately strong rock strength conditions. In the author's opinion, the grinding grooves at Site M37 can remain in place until year 9 without major risk of damage. However, to minimise the possibility of the lesser risks, the following recommendations are provided:

- Flyrock prevention barriers are installed, when blasting within a 500 metre radius. For an example of a flyrock prevention barrier refer to **Figure 8**.
- Displacement dial gauges are installed across the potential movable sections such as the observed joint. The dial gauge indicator could provide readings with accuracy in the order of 0.01 mm or 0.001 mm, see **Figure 9**.
- A vibration monitoring unit installed when blasting commences within a 400 metre radius.
- Improve security of the area via installation of fences.

Vibration monitoring and displacement monitoring should be also undertaken. The displacement monitoring could be an effective method for detecting the first signs or symptoms of potential issue (i.e. structural movement). The proposed dial gauges can be easily installed across a potential weak area such as the joint, as the joint should respond first to any potential movement. Monitoring 0.01 mm or 0.001mm, will be accurate and sufficient to assess any potential damage.

The flyrock prevention barriers could include three different possibilities:

- Flyrock mats commonly used in the USA – the main drawback is that the mats are installed via dragging them (due to the weight) which can potentially induce some scratches on the grinding grooves
- Preventive flyrock nets installed just above the grinding grooves. These can be easily erected as the considered area is relatively small. The erection could include installation of steel posts outside of the sandstone section and attaching two or three layers of wire mesh one metre or half a metre above the grinding grooves area. For an example of flyrock preventive mesh installed in one of the Hunter Valley Mines, refer to **Figure 8**. It shows such a flyrock preventive unit above a critical section of the underground ventilation fan, installed in close proximity of the active open cut pit.
- Mimicking flyrock mats, one could also install a temporary but effective flyrock barrier. This can be compiled of a number of tyres placed on the considered sandstone rock. On top of these tyres one or two sets of old conveyor belts (short pieces) can be effectively installed. This should provide an effective barrier for any potential flyrock issue. This can be achieved with minimal financial and labour input.

It is stressed that the potential period of time before any negative rock strata response is quite considerable.

9.2 Approach for Grinding Grooves which are not to be Relocated

The other three sites (Site MTW266, 267 and 268) were also assessed in detail in this report. The assessment revealed a weaker rock formation detected for these grinding grooves. This is in direct comparison to Site M37 West and East.

Nevertheless, it should be said that these sites will be a considerable distance from the proposed blasting area. The estimated distances for each grinding grooves area from the final proposed pit shell of the Warkworth Extension are estimated in the following orders:

- **Year 9**
  - Site MTW-266 – 3340 metres

- Site MTW-267 – 3375 metres
- Site MTW-268 – 3360 metres

- **Year 21 (final pit shell)**
  - Site MTW-266 – 2160 metres
  - Site MTW-267– 2150 metres
  - Site MTW-268 – 2140 metres

Therefore, based on the undertaken vibration modelling (i.e. no higher than 6 mm/s), taking into consideration the strength of the structures and their distance from the blasting area, it is stated that no significant risks for these grinding grooves can be concluded. Therefore, there is no need to undertake any preventative steps by MTW. The study concluded the absence of any major risks of damage for the considered grinding grooves (Sites MTW-266, 267, and 268).

10. CONCLUSIONS AND RECOMMENDATIONS

At the request of MTW, an assessment in relation to the impact of blasting on the existing Aboriginal grinding grooves was undertaken. The assessment was requested to determine what damage criteria, if any, exist for the Aboriginal grinding grooves that are identified in Schedule 3, Condition 12 b) and c) of the Project Approval. Potential risks relating to each grinding groove were assessed, including damage from blasting especially vibrations and flyrock impacts.

The study has been supported by a review of relevant documentation, proposed extraction plans (including blast design details) and a site inspection undertaken on the 13.04.12 in the presence of Coal and Allied personnel and ESC's principal consultant. The investigation is summarised as follows:

The points of interests analysed in this report was grouped into two categories, i.e.

- Aboriginal artefacts to be relocated – Sites M37 East and West
- Aboriginal artefacts to stay – Sites MTW 266, 267, and 268

The analyses in this report involved a number of assessments. These included:

- Site visit, overview of points of interest and rock testing
- Vibration damage assessment, including vibration modelling
- Author's experience with exposing a variety of infrastructure / rock strata to various vibration levels, including high vibration exposure
- Review of relevant overseas studies

Based on the above analyses the following conclusions were reached:

- The risks related to blast exposure have been clearly explained and are presented in Section 5 of this report. The two major risks from blast exposure identified are: vibration and related damage, and potential flyrock damage. The risks are dependent upon the maximum instantaneous charge and distance from the blasting area.
- Each grinding groove site has been inspected and discussed, with each site individually assessed. The vibration exposure and potential damage implications for each location have been analysed in detail. This is based on an assessment of the strength of the material, as well as previous vibration studies for similar structures.
- Summaries of the predicted levels of vibrations for the points of interest, incorporating various charge masses (based on different bench heights), are presented in tabulated as well as graphical formats. The provided data can be used as a confirmation guide to indicate the acceptable levels for location.
- The vibration modelling revealed low vibration levels for the sites MTW 266, 267 and 268. This is for the considered blast vibration impact including the final Warkworth Extension pit boundaries to be reached in year 21. The estimated vibration levels were in the order of 0.5 – 6.0 mm/s (i.e. based on vibration impact snapshots for years 9 and 21). Considering the estimated distances (i.e. in excess of 2000 metres from the final pit wall) and estimated vibration exposures, the study did not identify any major risks related to structural damage
- The analysis revealed that Site M37 can be exposed to moderate / high blast vibration impacts without any negative impact on the integrity of the grinding grooves. This is due to the robustness of the sandstone material considered. Based on the author's experience, the vibration levels (in the order of 250 - 300 mm/s) are generally insufficient to cause damage to sandstone material of an estimated strength of 24 – 28 MPa. The inferred vibration damage level for the considered sandstone material (including grinding grooves) is estimated to be 300 mm/s.
- The vibration modelling for the year 9 pit boundaries revealed that Site M37 (East and West) could potentially be exposed to approximate vibration levels of 13 - 142 mm/s (depending on the bench size). This is for year 9 pit boundaries, which is considered as a pre-relocation stage. The inferred vibration exposure should not provide any significant risks in regards to potential damage for Site M37.
- The undertaken modelling is extremely conservative and provides the worst case scenario. However, in reality as the mine progresses to the West the mine management will be forced to use either smaller explosive charges (i.e. deck charges) or smaller bench sizes. This is to reduce the charge mass and therefore minimise vibration impacts on the surrounding environment. Otherwise, the mine would risk exceeding the 5 mm/s vibration limit imposed for the Bulga village residences, not to mention the annoyance for the public. As such, the use of a 62

metre bench size (as modelled in this report) will practically be redundant. Nevertheless, to cover all possibilities this option (i.e. use of high benches) is still considered in this report.

- It must be noted that site M37 will be relocated ahead of mining, it is anticipated this will be in the next two years. In the event that relocation is delayed flyrock protection should be considered when blasting is within 500 meters of the site.
- To ensure that Site M37 is not negatively impacted by the discussed blast impacts, and ensure that the described behaviour is as portrayed in this report, some limited monitoring can also be undertaken. This could include vibration monitoring and / or displacement monitoring. The displacement monitoring could be an especially effective method for detecting the first signs or symptoms of any potential issue (i.e. structural movement). The other recommendations could also include installation of flyrock preventive barriers and improvement on the security of the areas. The details on various available options are presented in Section 9 of this report.

Thomas Lewandowski
27th June 2012

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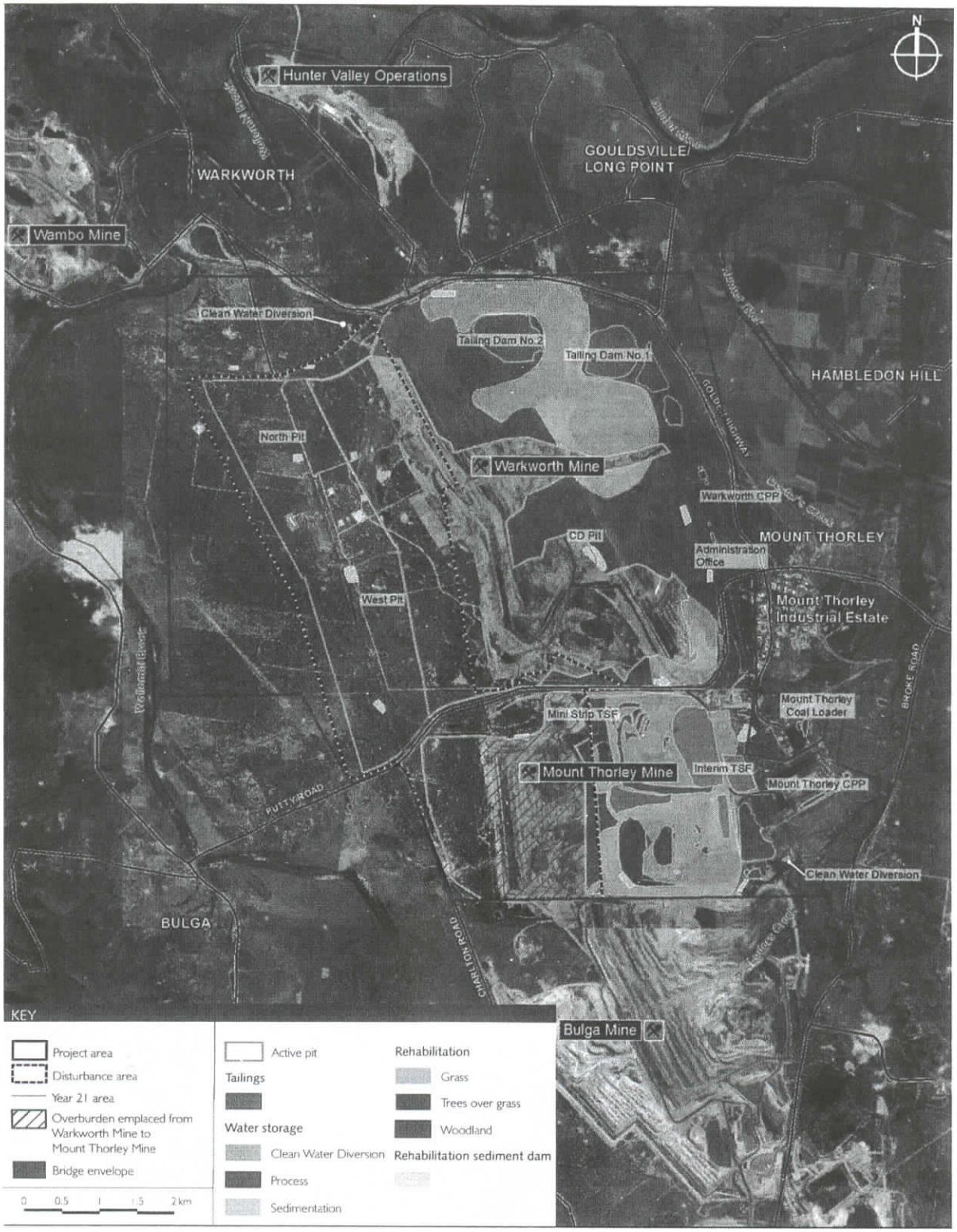
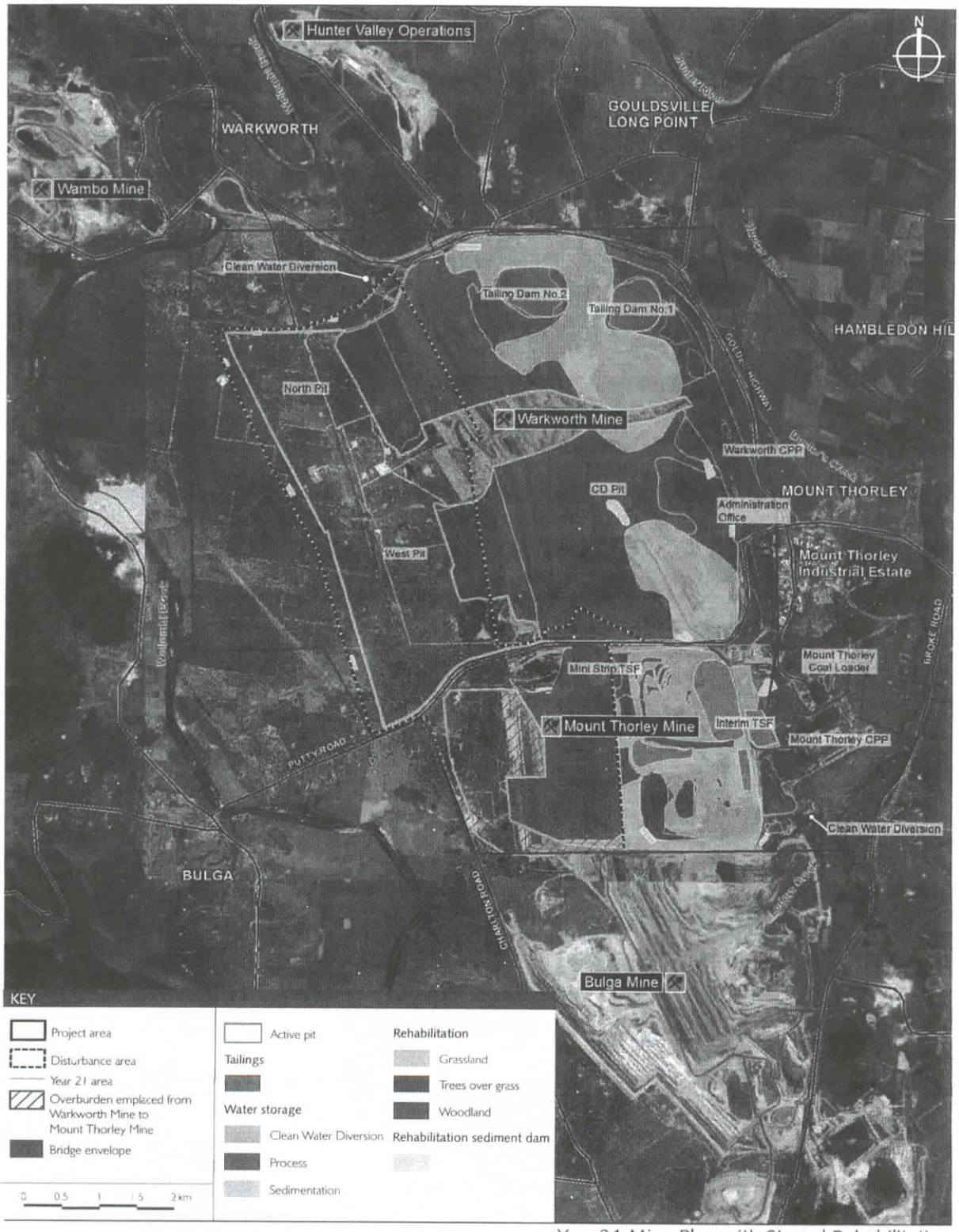
FIGURES



Year 9 Mine Plan with Staged Rehabilitation

COAL & ALLIED

FIGURE 1A



Year 21 Mine Plan with Staged Rehabilitation

COAL & ALLIED

FIGURE 1B

FIGURE 3 – Warkworth Grinding Groove Site M37 West (after SCT 2010)

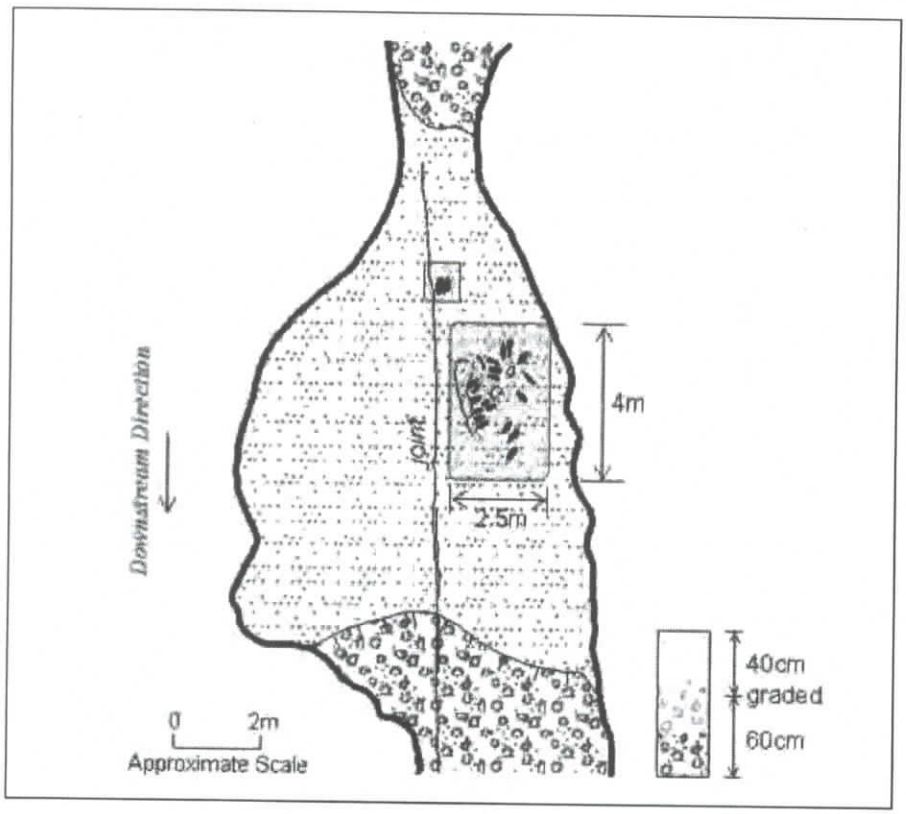


FIGURE 4 – Grinding Grooves – Site M37 East (after SCT 2010)

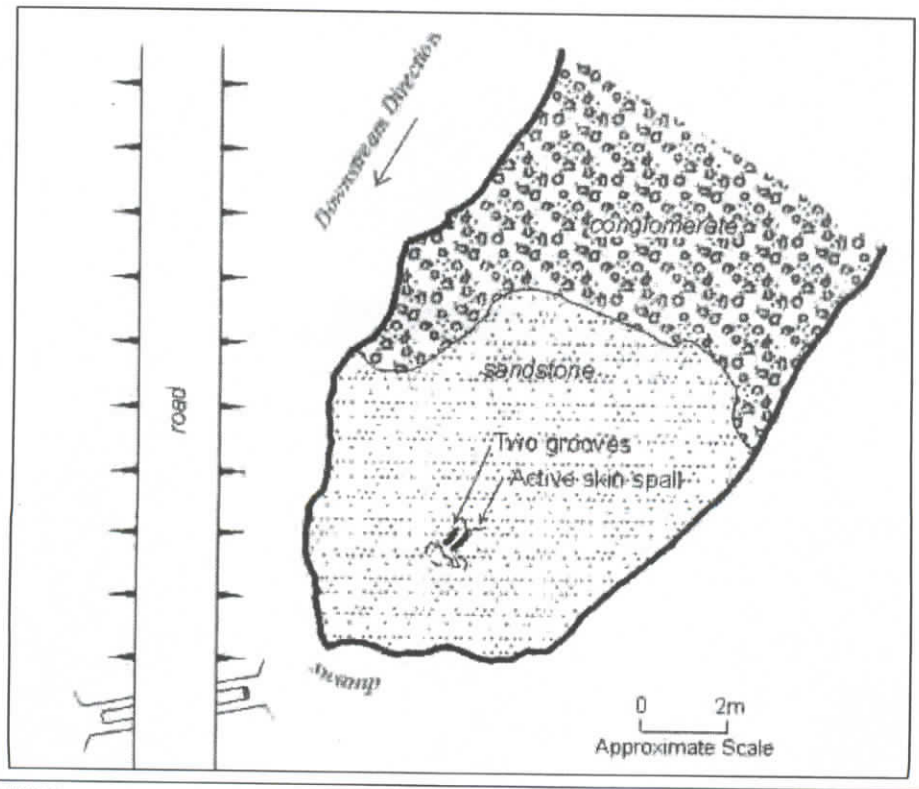


FIGURE 5A – Ground vibration Modelling – Year 9, 15m Bench, MIC 481 kg, ANFO

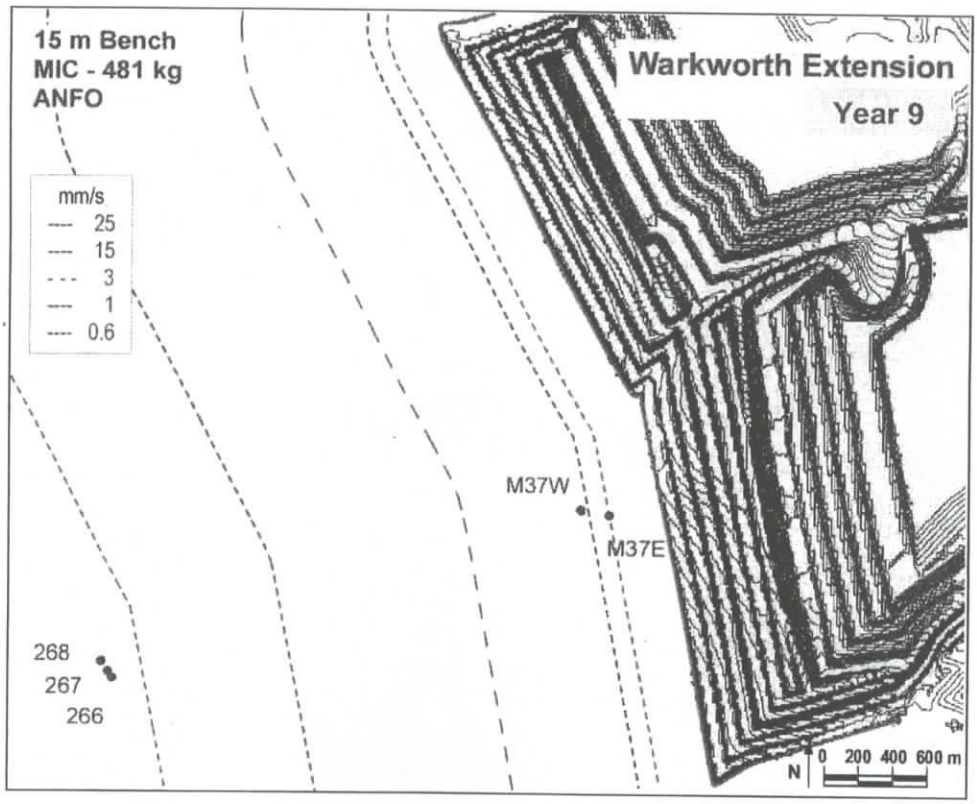


FIGURE 5B – Ground vibration Modelling – Year 9, 15m Bench, MIC 722 kg, Heavy ANFO

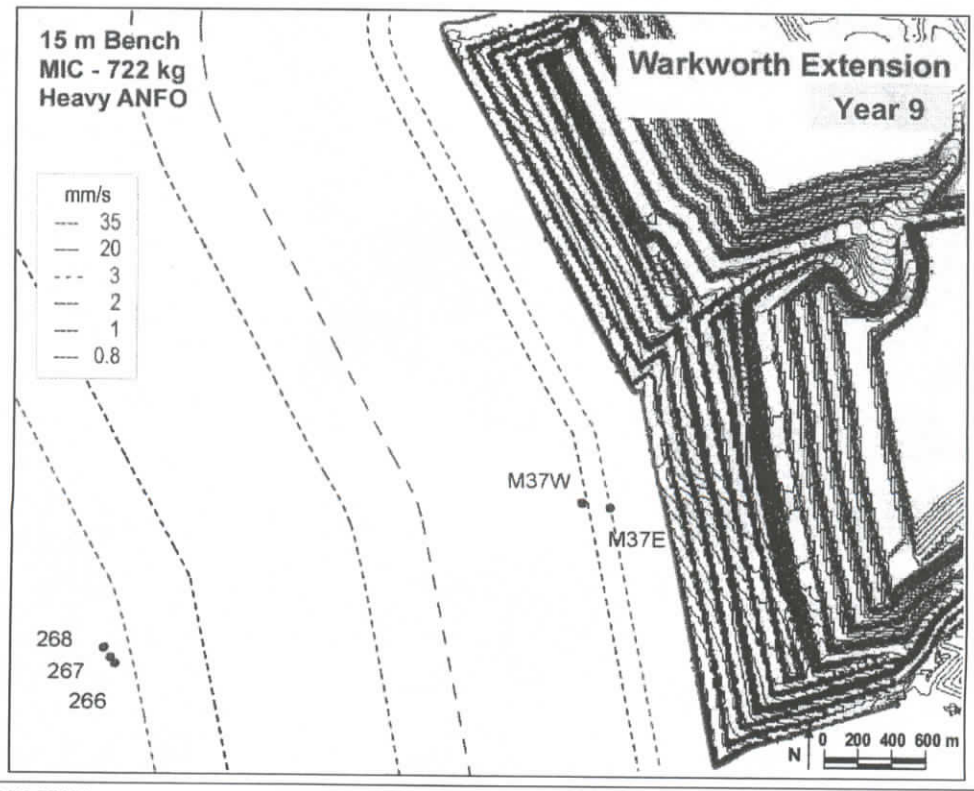


FIGURE 5C – Ground vibration Modelling – Year 9, 40m Bench, MIC 1626 kg, ANFO

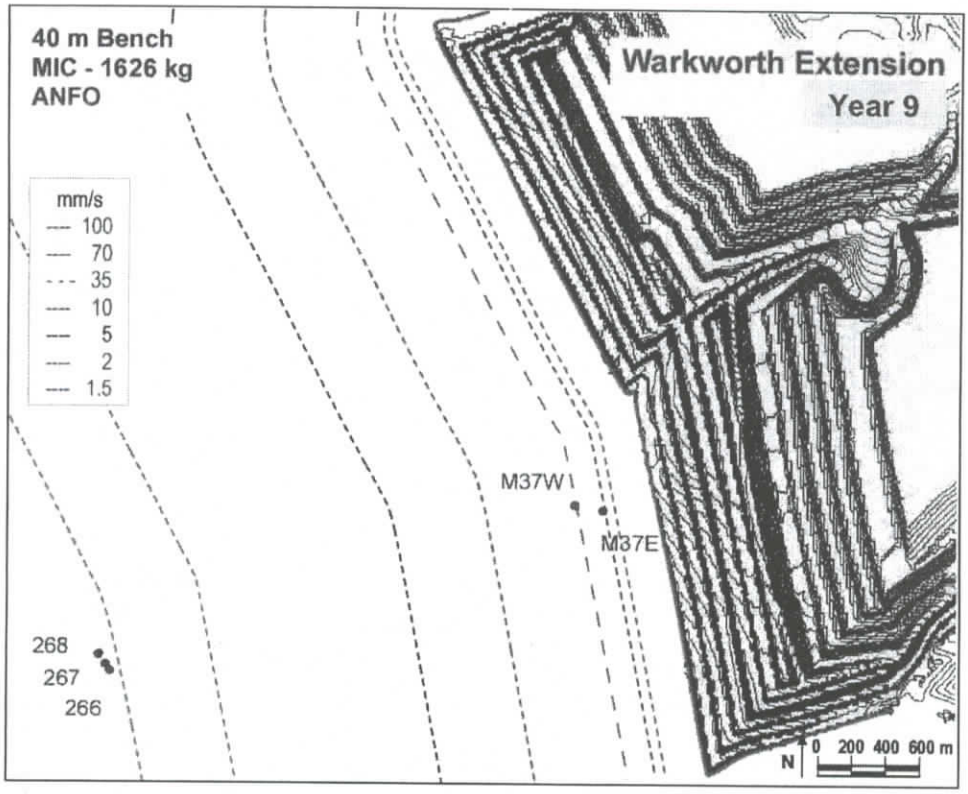


FIGURE 5D – Ground vibration Modelling – Year 9, 40m Bench, MIC 2439 kg, Heavy ANFO

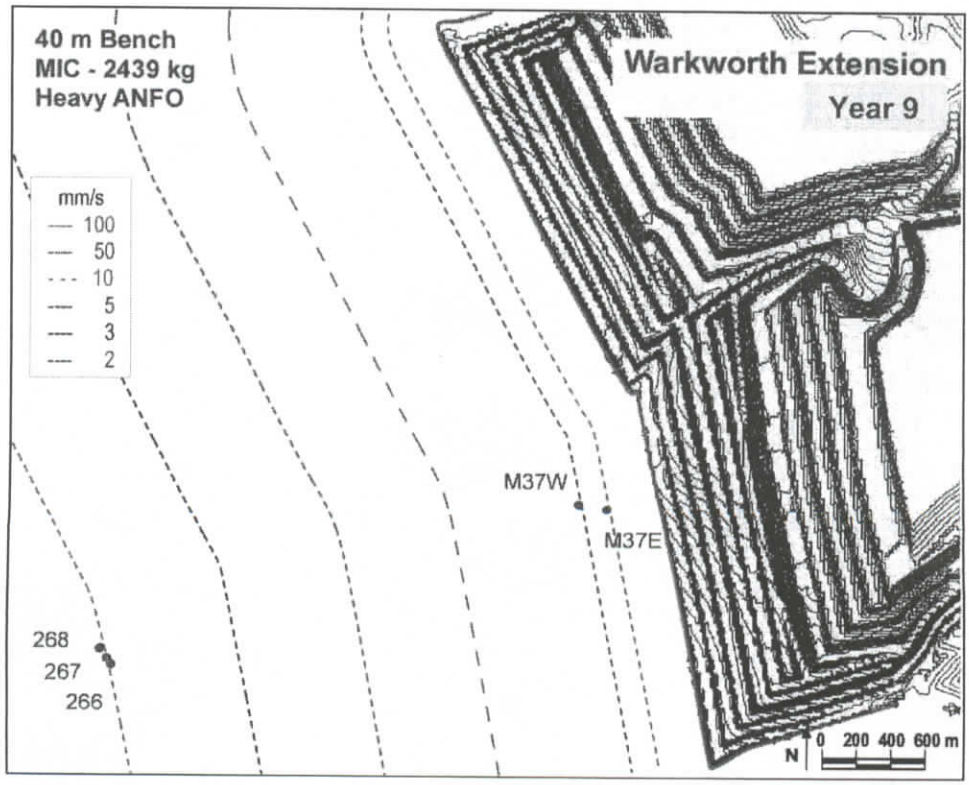


FIGURE 5E – Ground vibration Modelling – Year 9, 62m Bench, MIC 2565 kg, ANFO

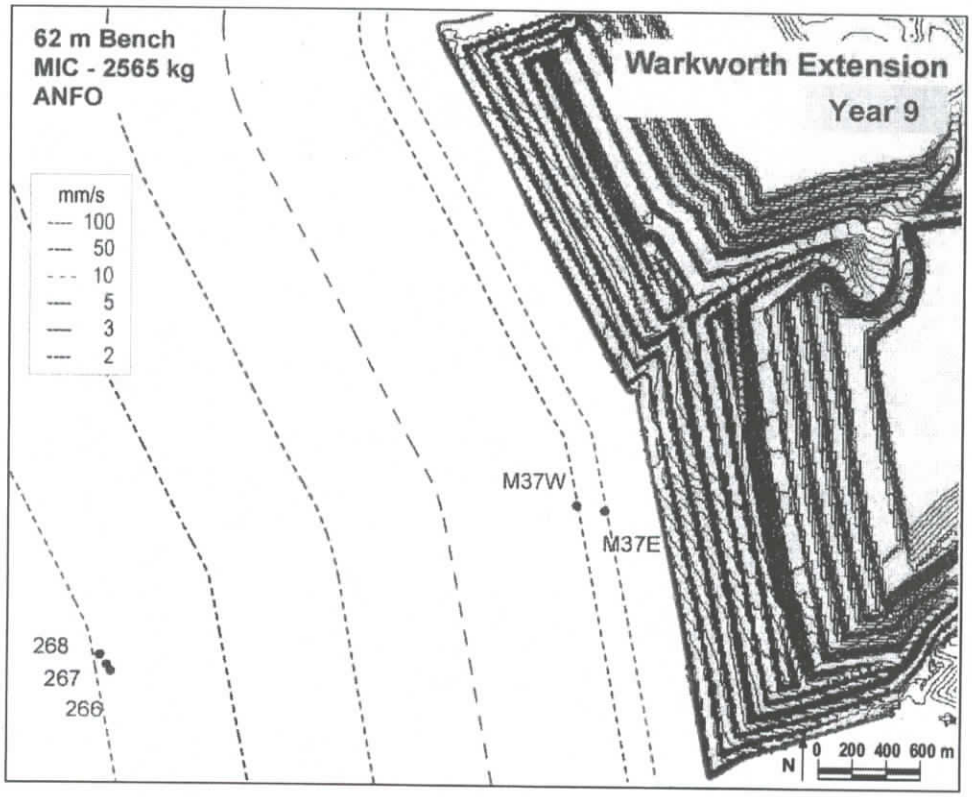


FIGURE 5F – Ground vibration Modelling – Year 9, 62m Bench, MIC 3848 kg, Heavy ANFO

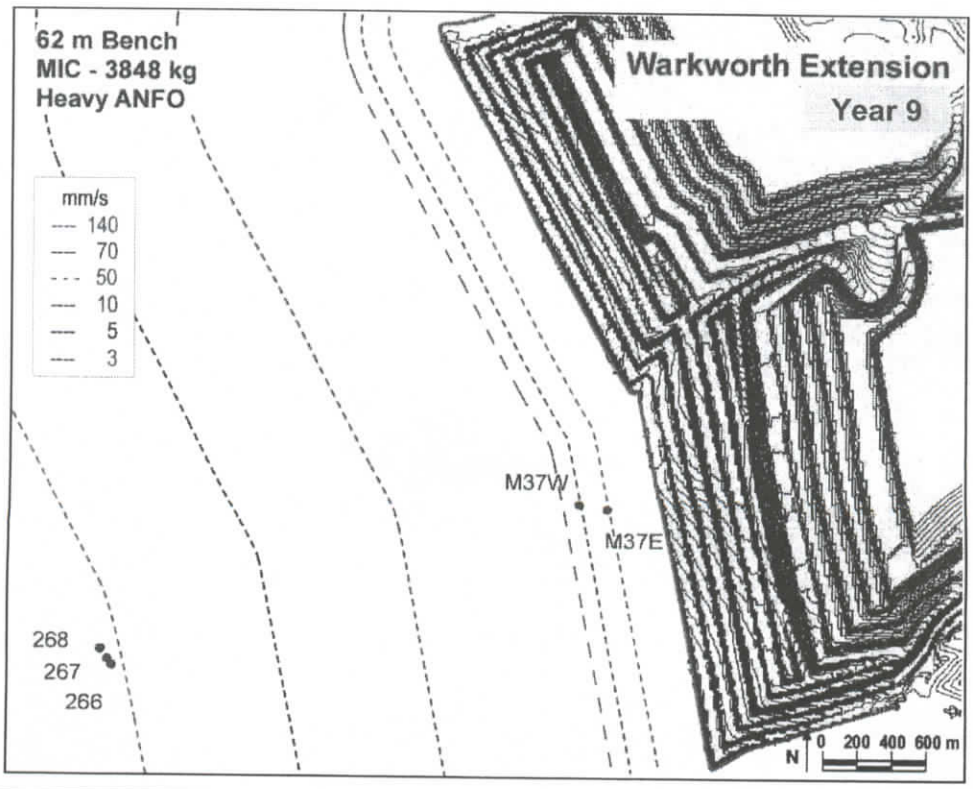


FIGURE 6A – Ground vibration Modelling – Year 21, 15m Bench, MIC 481 kg, ANFO

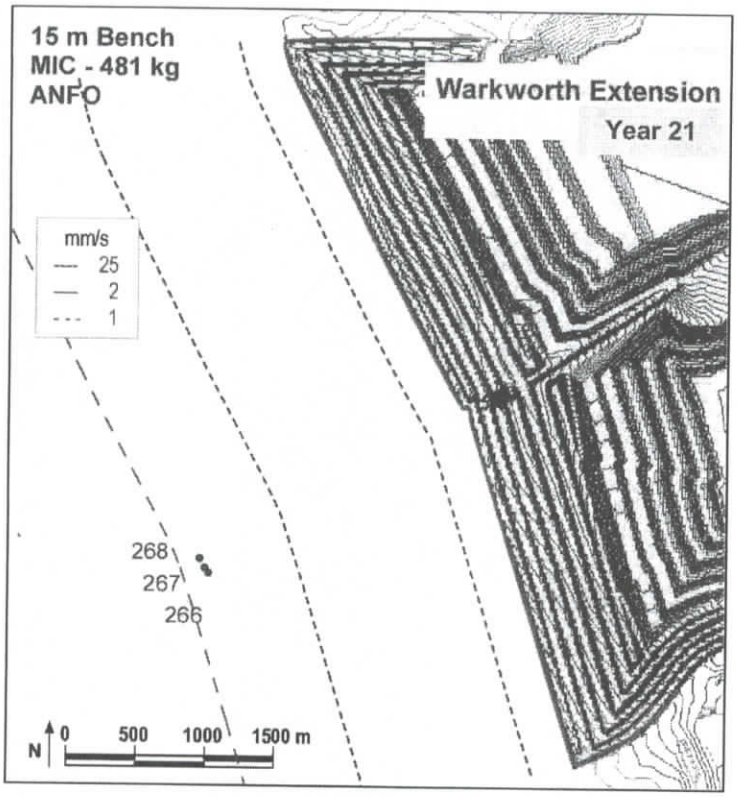


FIGURE 6B – Ground vibration Modelling – Year 21, 15m Bench, MIC 722 kg, Heavy ANFO

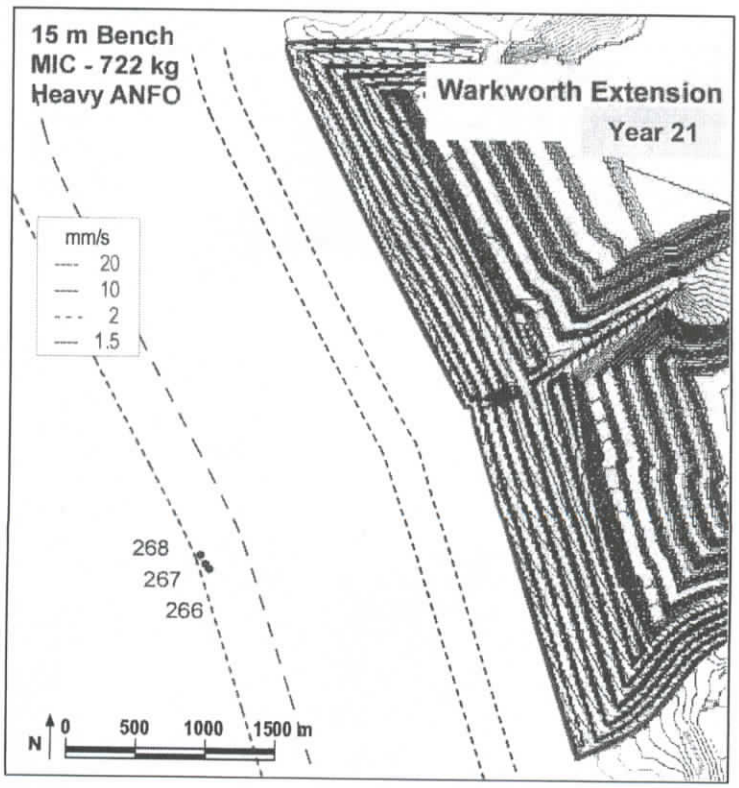


FIGURE 6C – Ground vibration Modelling – Year 21, 40m Bench, MIC 1626 kg, ANFO

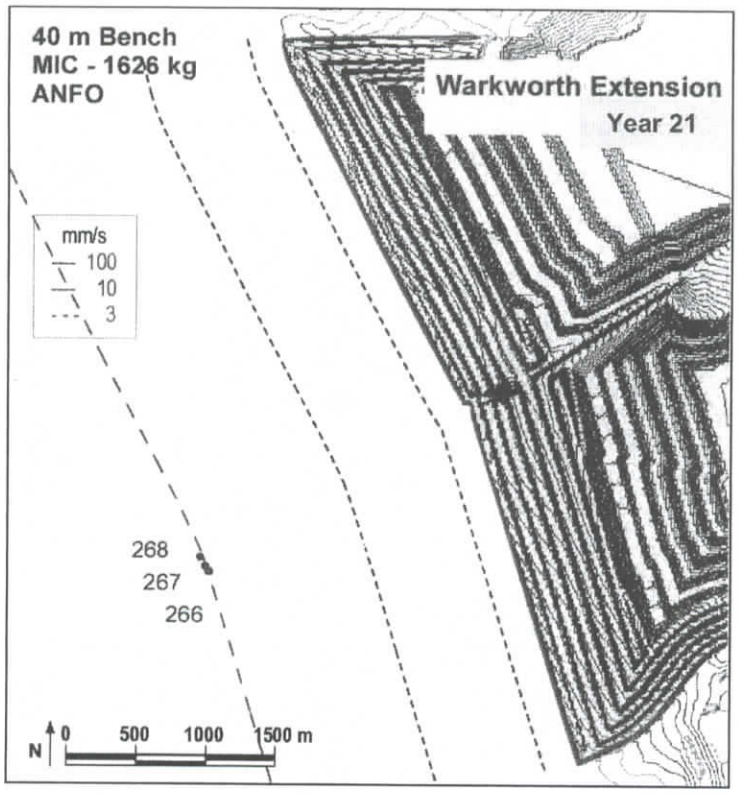


FIGURE 6D – Ground vibration Modelling – Year 21, 40m Bench, MIC 2439 kg, Heavy ANFO

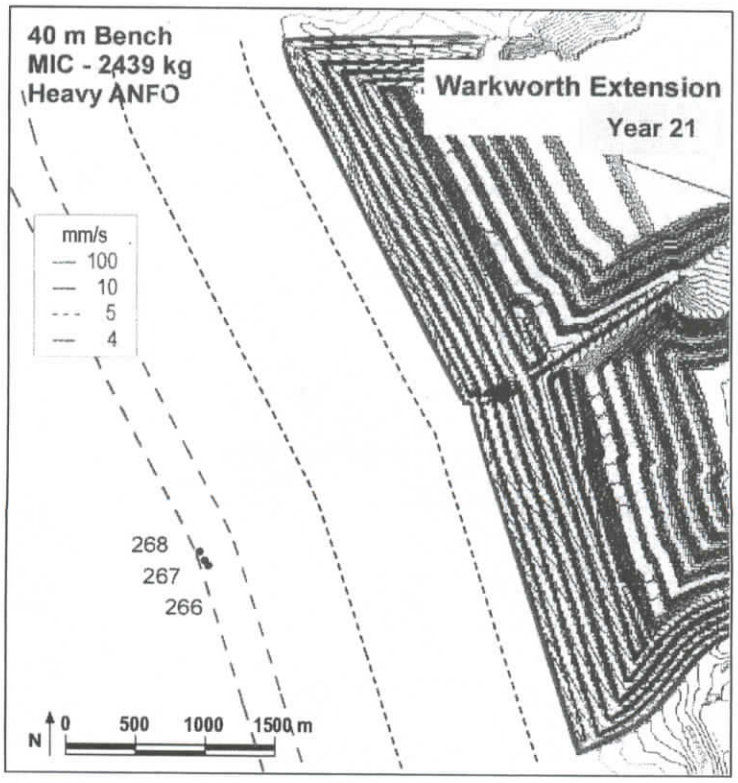


FIGURE 6E – Ground vibration Modelling – Year 21, 62m Bench, MIC 2565 kg, ANFO

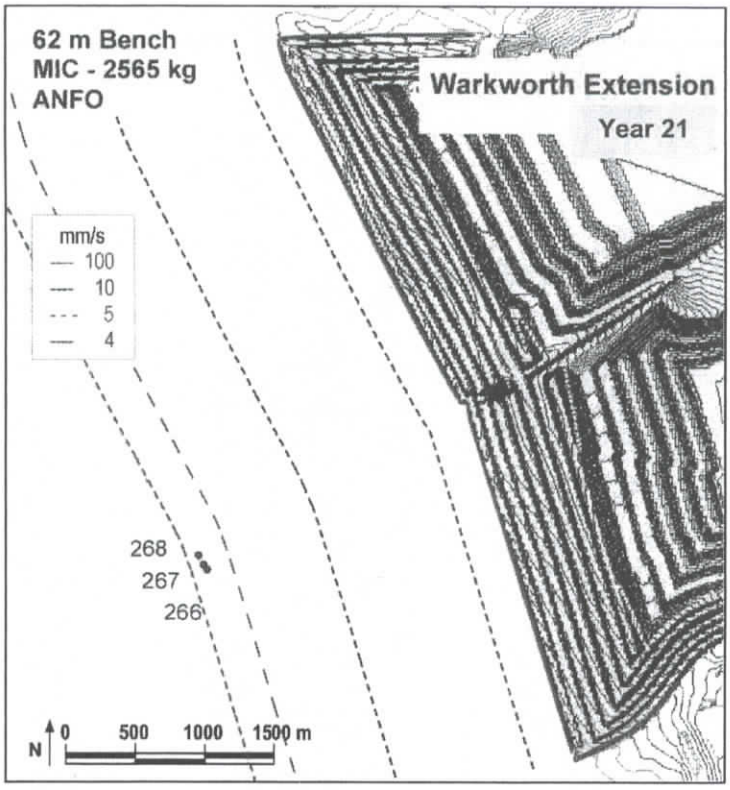


FIGURE 6F – Ground vibration Modelling – Year 21, 62m Bench, MIC 3848 kg, Heavy ANFO

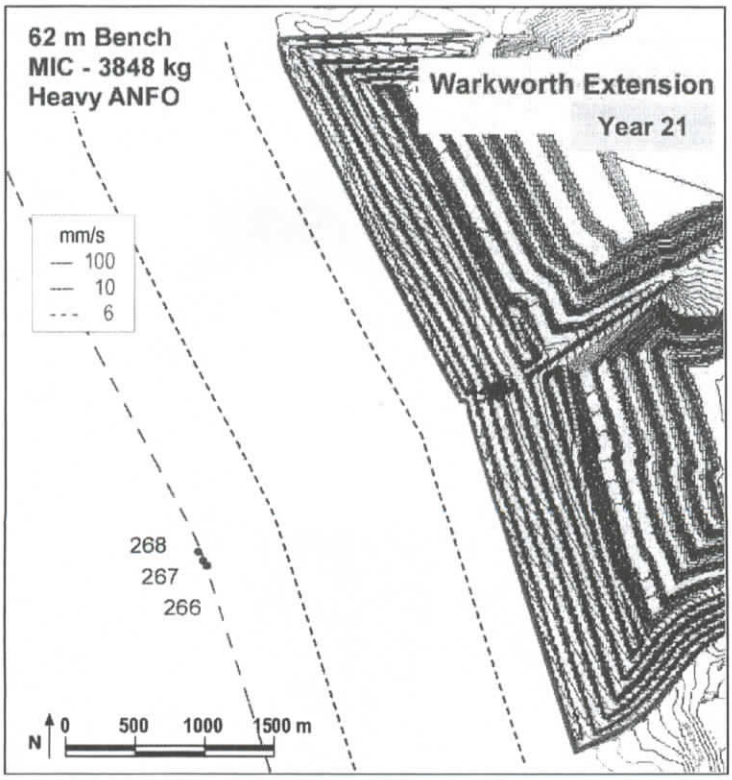


FIGURE 7A – The probability of flyrock range exceeding a prescribed value (after Little and Blair 2009)

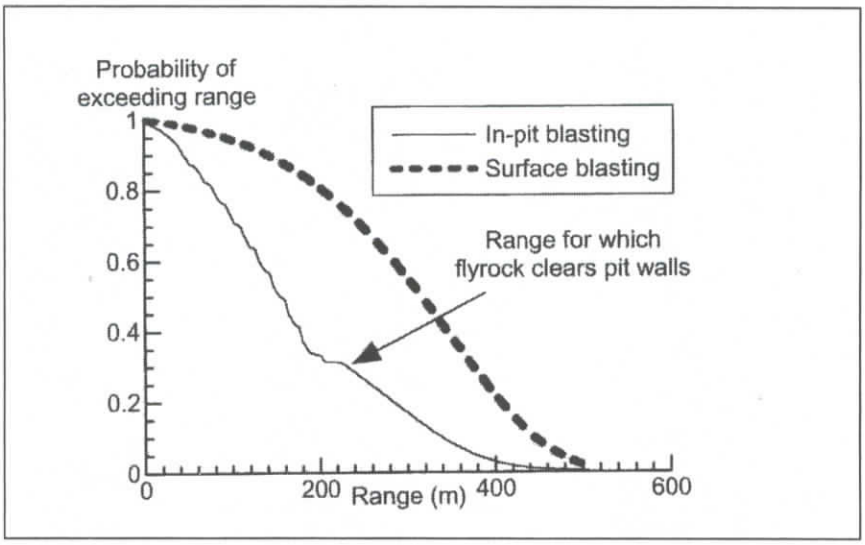


FIGURE 7B – Reported Flyrock Distances (after Davies 1995)

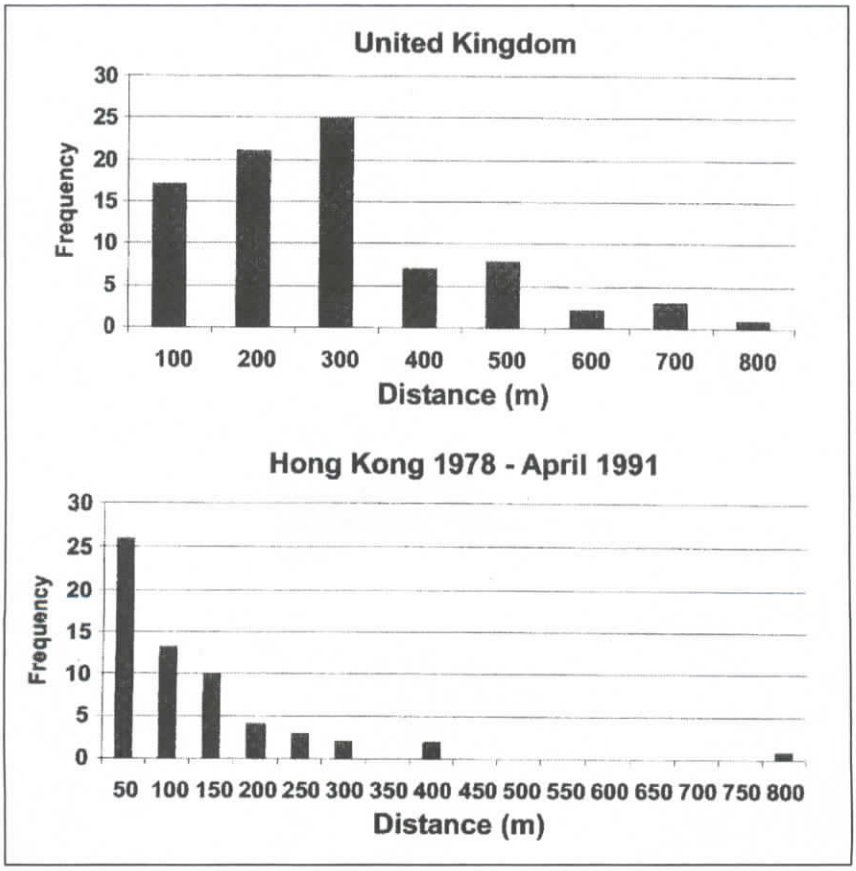


FIGURE 7C – Modelling of flyrock trajectories over flat ground (after Little and Blair 2009)

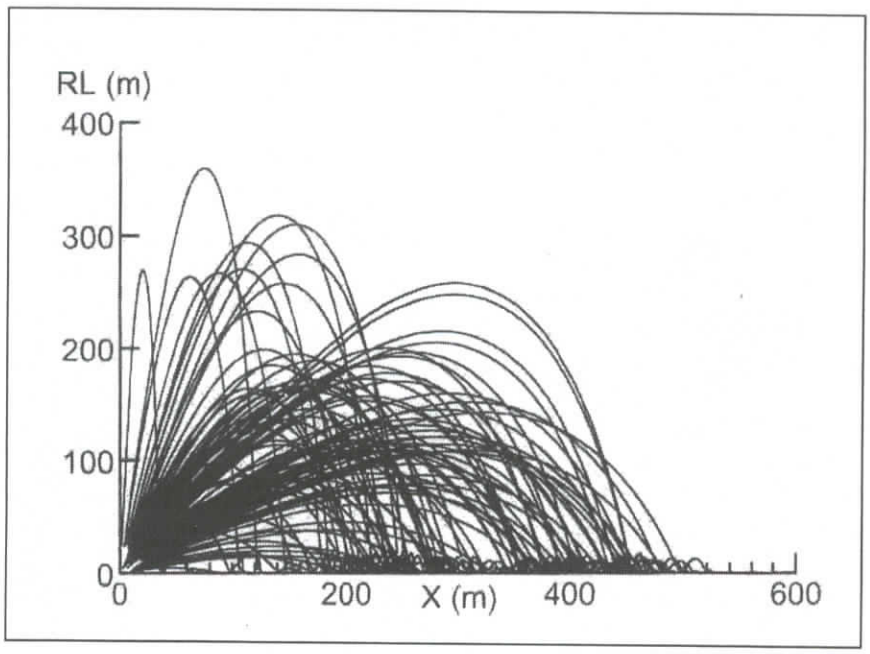


FIGURE 7D – Modelling of flyrock trajectories over pit walls (after Little and Blair 2009)

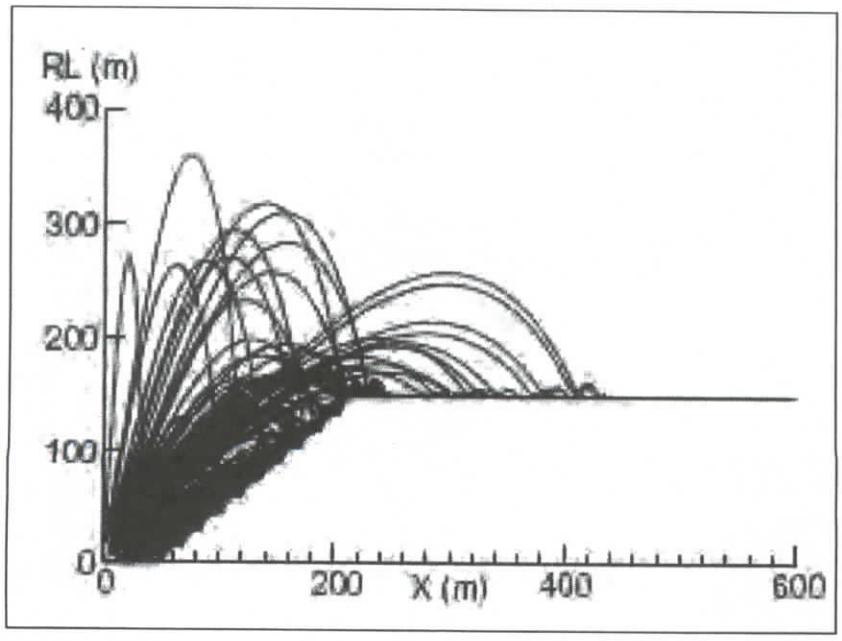
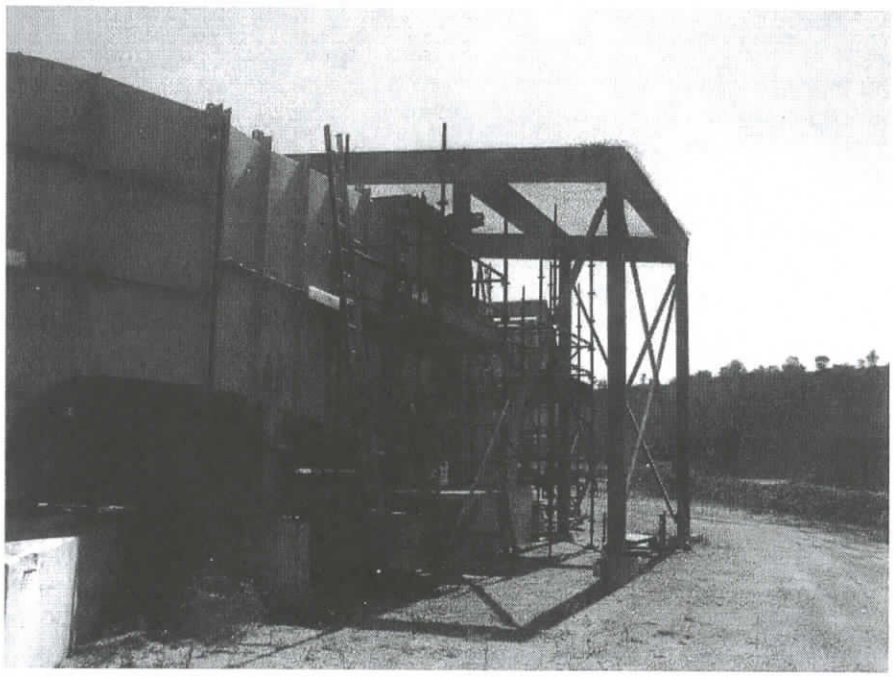


FIGURE 8 – Example of Flyrock Preventive Barrier



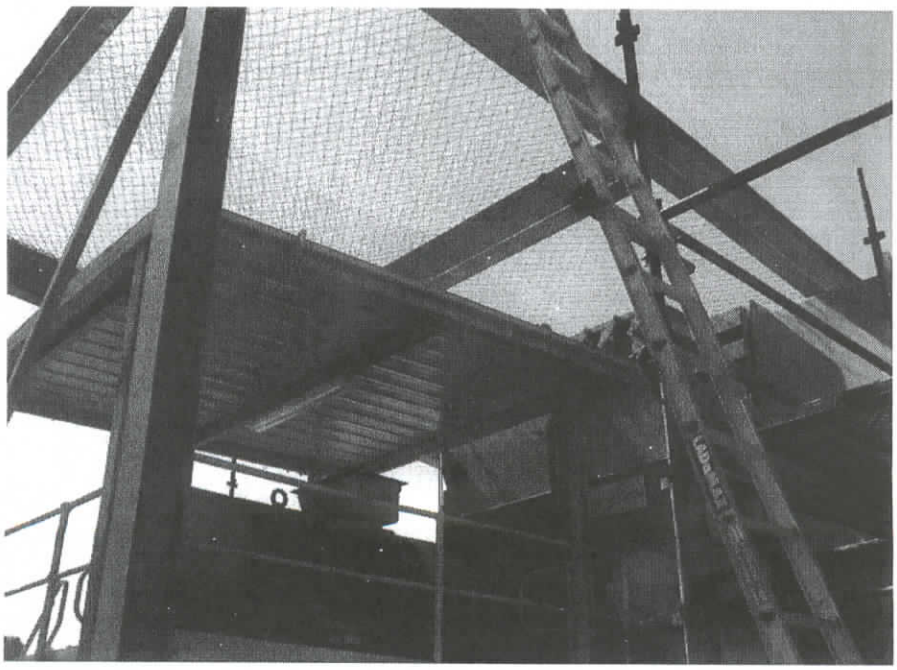


FIGURE 9A – View of Dial Gauge Crack Meter – Accuracy 0.01 mm

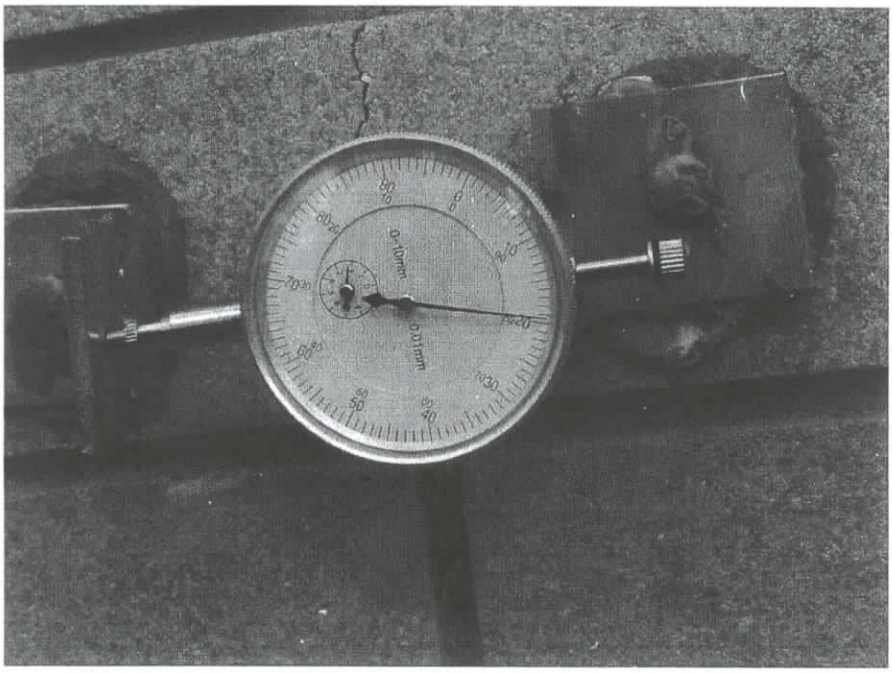
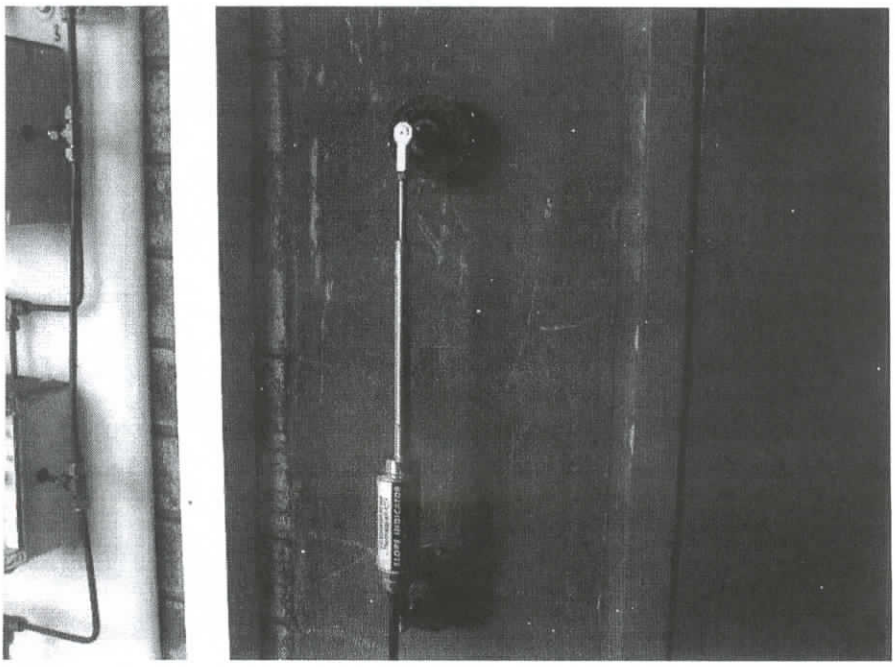


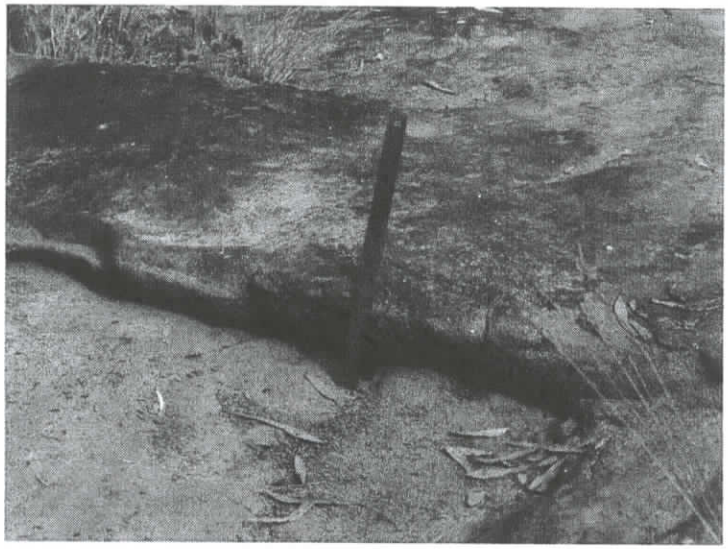
FIGURE 9B – View of VW Crackmeter – Accuracy 0.001mm

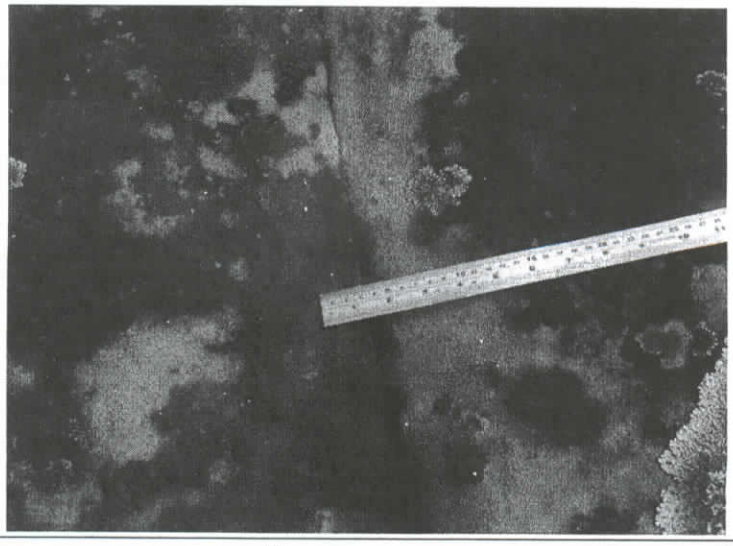


APPENDICES

APPENDIX 1 – Site M37 West

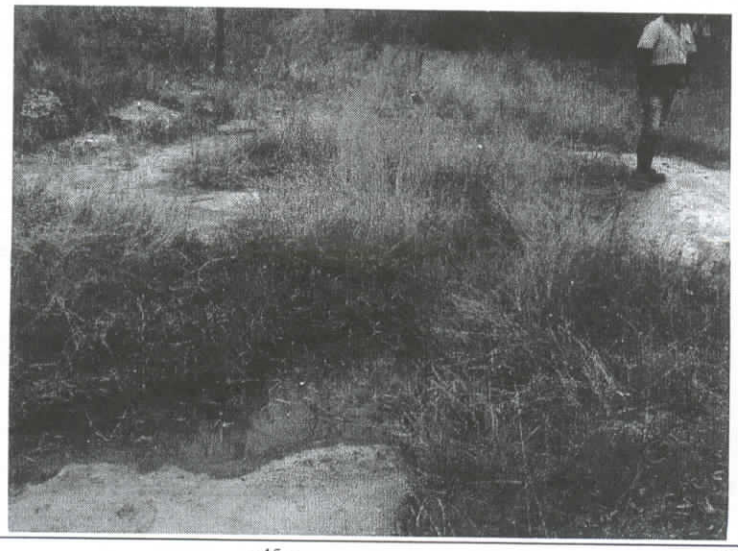
APPENDIX 1 – Site M37 West (continued)



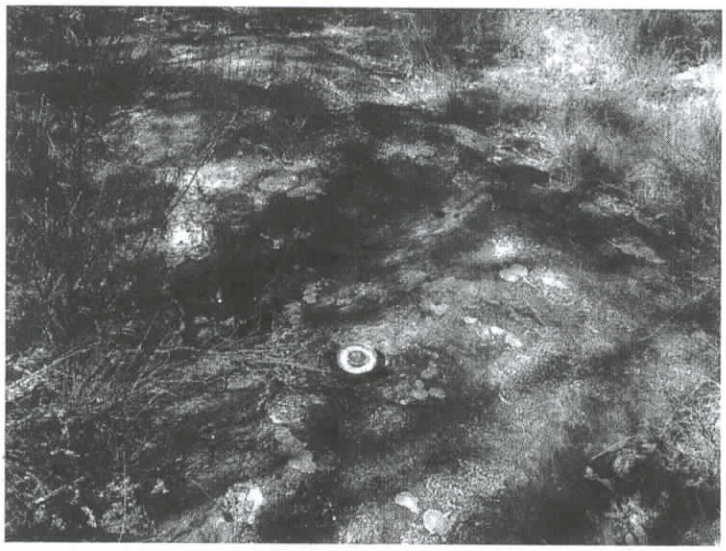


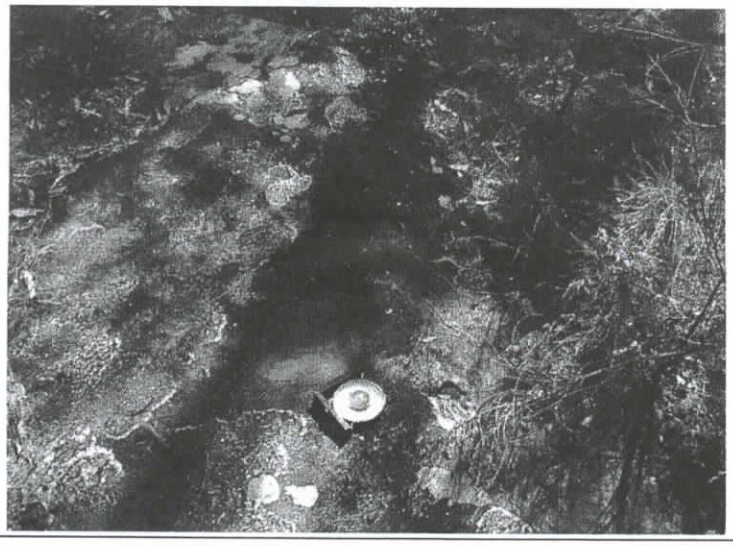
APPENDIX 2 – Site M37 East

APPENDIX 2 – Site M37 East (continued)

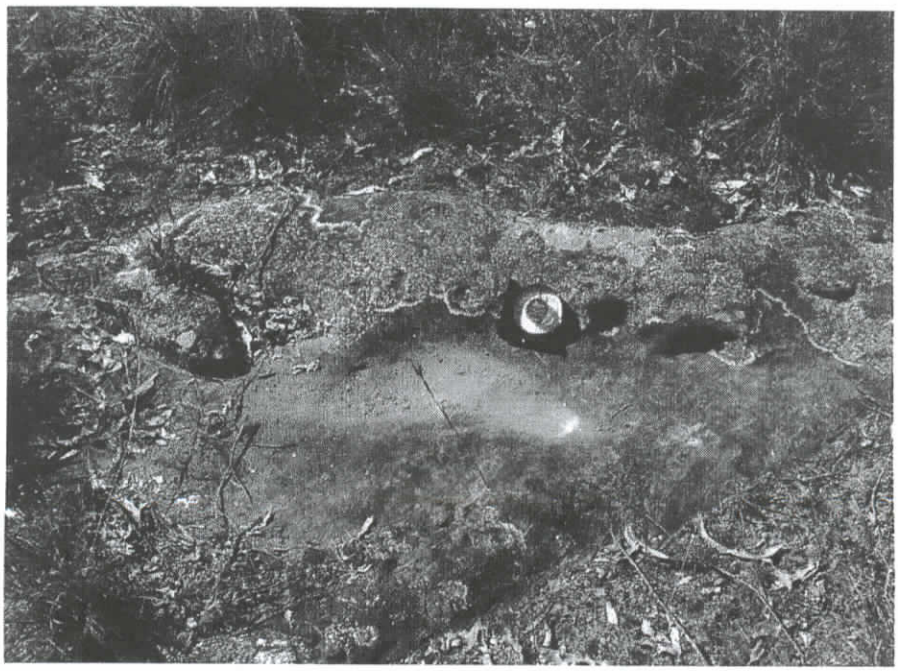


APPENDIX 3 – Site 267





APPENDIX 4 – Site 268



APPENDIX 5 – Site 269

Appendix D -Blast Impact Assessment of the Warkworth Extension Project on Wambo Homestead, St. Phillips Church and Bulga Bridge

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MOUNT THORLEY / WARKWORTH

BLAST IMPACT ASSESSMENT OF THE WARKWORTH EXTENSION PROJECT ON WAMBO HOMESTEAD, ST. PHILLIPS CHURCH AND BULGA BRIDGE

REPORT NO. MT-1247-270612

Thomas Lewandowski
27th June 2012

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1. INTRODUCTION

Enviro Strata Consulting (ESC) was requested by Mount Thorley Warkworth (MTW) to undertake an independent assessment of the Warkworth Extension Project and its impact on the Wambo Homestead, St Phillips Church and Bulga Bridge (the Historical Structures). The purpose of this assessment is to support the monitoring program required to be implemented in accordance with Schedule 3, condition 20(e) of the Project Approval PA 09_0202 granted for the Warkworth Extension Project (the Project) on 3 February 2012 (the Project Approval) to ensure these Historical Structures are not damaged by blasting on the MTW mine site.

The Project will mine west of the current MTW operations. The distance between the open cut blasting of the Project and location of the Historical Structures will be reduced.

This report addresses the following issues:

- Estimation of potential vibration exposure for the Historical Structures;
- Risks to the Historical Structures associated with blast exposure from the Project; and
- Recommendations for risk mitigation (if risks are identified).

The report is based on information provided by MTW including blasting plans, blasting details and related consultants' reports on blasting, and a site visit undertaken on 22 May 2012 by the author.

2. PROJECT METHODOLOGY

MTW has been granted the Project Approval which permits, among other things, the extension of current mining operations at Warkworth Mining Limited to the west (see **Figures 1A-B** which show MTW's expected progression for years 9 and 21). As part of the Project Approval Schedule 3, condition 12(a) requires MTW to ensure that blasting on site does not damage the Historical Structures.

In considering the blasting risks the assessment undertaken takes into account:

- existing vibration limits, specific to each piece of infrastructure;
- the Project boundary; and
- blast design parameters which will be used during the Project's lifetime.

The vibration modelling presented below numerically quantifies the possible impact of vibrations on each of the Historical Structures in years 9 and 21 of the Project.

3. SITE DESCRIPTIONS AND VIBRATION LIMITS

3.1 Site Descriptions

A visit to the three sites on which the Historical Structures are located was undertaken by ESC's principal consultant on 22 May 2012 and included a visual overview of each of the Historical Structures supported by a photographic record.

The locations of the Historical Structures visited are shown in **Figures 1A-B** with the current and future (years 9 and 21) mining operations of MTW overlayed.

Presented below is a short description of each of the Historical Structures. The descriptions are based on the information gained from the internet search, see References section for details.

WAMBO HOMESTEAD

Wambo Homestead consists of eight buildings which were constructed between 1833 and 1900 (refer to **Appendix 1** for images of the Wambo Homestead). Since 1969 the homestead has been owned by local mining companies. Due to substantial mining in the area the homestead has become isolated and public access to it is limited.

Wambo Coal Mine, which is the closest mine to the Wambo Homestead has approval to operate until 2025. Due to weather and termites the conditions of the buildings have deteriorated. The buildings have been vacant for over a decade.

In July 1996 the Wambo Homestead and outbuildings were classified as heritage items of State significance under the *Singleton Local Environment Plan 1996* (NSW). In

April 1999 the Wambo Homestead was also listed on the State Heritage Register (established under the *Heritage Act 1977* (NSW)). This listing means that any works to the buildings or within the curtilage of the Wambo Homestead will require the approval of the NSW Heritage Council.

An inspection of the Wambo Homestead was carried out by Godden Mackay Logan Heritage Consultants in July 2010. The findings of that inspection are set out in the report titled 'Wambo Homestead Complex; Heritage Strategy' and dated September 2010. A summary of the description of the Wambo Homestead, as per that report, is set out below.

Slab Horse Boxes ('The Stallions' Box') -

- *Age* – built between 1900 and 1906.
- *Structure* – pole framed with timber slab walls and corrugated iron roof over timber shingles. The building relies only on its frame and the fixing and bolting for its structure.
- *Condition* – this building stands in good condition considering its age. No damage to the structure or slab is evident. Damage to the roof shingles indicates possible termite presence (in the roof shingles only). Some deterioration is expected in the post bases and wall slabs due to the posts being buried in damp earth. Due to Corrosion, the water tank is fragile with the base having collapsed. The concrete slab on which the water tank sits is broken and cracked.

Carriage House with Stables and Granary -

- *Age* – established in 1840.
- *Structure* – a one and a half story building. The building stands pole framed with a timber slab and weatherboard walls. There is no bracing to the corrugated iron roof over timber shingles. The structure relies on the frame and rigid fixings.
- *Condition* – this building has suffered from tree and weed growths along with severe termite activity which has damaged the building and caused structural movement.

Butcher's Hut -

- *Age* – built in 1901.
- *Structure* – a pole framed, double timber slab with walls. Rammed earth insulation in the walls and ceiling. Ventilated, with open gables in the corrugated iron roof.
- *Condition* – there is no evidence of termite or structural damage and the building stands in good-fair condition. Due to vegetation growth there has been some break down to fixings and with no diagonal bracing, the building is separating.

The Servants' Wing -

- *Age* – built in 1844.
- *Structure* – a brick, one and a half storey structure with a corrugated iron roof over timber shingles. Log joists are in the attic and ground floor.

- *Condition* – the Servants' Wing is in poor condition. Due to the disintegration of both verandas there is no shelter to walls and adjacent ground. Roofing has collapsed into the attic rooms, leaving the north gable without support. There is no stair access to the attic. The rendering to walls stands one metre above ground level. The mortar has dissipated and brick erosion is intermittent. Brickwork has collapsed due to the loss of soft lime/mud mortar. Walls are in danger of collapse as they have been weakened by cracks and deformation of the building's foundation. The internal walls have upheld damage to half their thickness. Collapsed brickwork to timber joinery is evident in the West facing windows.

The Kitchen Wing (former House) –

- *Age* – built in the years 1830, 1837 and 1906.
- *Structure* – stands two storeys, is made from sandstone brick and a corrugated iron roof over timber shingles and includes a part basement.
- *Condition* – the flooring is unsafe and there is major deterioration due to termites.

The New House –

- *Age* – built in 1847
- *Structure* – single storey rendered brick with a corrugated iron roof over timber shingles.
- *Condition* – due to termite activity there is increasing deterioration combined with moisture impediment.

The Stud Master's Cottage –

- *Age* – built in 1837.
- *Structure* – single storey brick with a corrugated iron roof on timber shingles.
- *Condition* – overall this structure is in very poor condition with no roof. The top of the building is currently covered in tarpaulins. Debris and slabs surround the area and all windows are boarded. Old render repairs have increased the deterioration to the brickwork.

Mounting Yard, Horse Boxes and Stock Yards –

- *Age* – established in 1906
- *Structure* – a pole framed building with splayed weatherboard walls and a corrugated iron roof.
- *Condition* – this building faces extensive fabric loss with a large unbraced section of the roof facing collapse.

In summary the Wambo Homestead represents a historic structure in the area of the Project. As it will be explained later in this report the Project will be a substantial distance away, in excess of 3000 metres, from the Wambo Homestead.

The adjacent Wambo Coal Mine operates on the basis of a 5 mm/s vibration limit with some blasts undertaken within 550 metres of the Wambo homestead (using a 15 metre bench). A comparison of the distances from the Wambo homestead to the Project and to the Wambo Coal Mine shows a considerable difference. Therefore accounting for the distance difference and the vibration limit, it can be expected that the blast impacts will be relatively low and limited. More detail in regards to the possible blasting impacts will be further discussed in the vibration modelling section.

St PHILLIPS CHURCH, WARKWORTH

The St Phillips Anglican Church was consecrated in 1856. The building is not on the State Heritage Register but is a heritage item classified as being of regional significance under the *Singleton Local Environment Plan 1996* (NSW).

The two most elevated parts of the structure include a bell tower and cross. Adjacent to the church there is an old cemetery (see **Appendix 2**).

Over the years the building has been refurbished. For example,

- the original shingle roof was replaced by a galvanized iron roof about 40 years after its construction,
- in 1955, the original brick work was covered with a cement coating fashioned to resemble stone blocks after the church and graveyard experienced extensive damage due to floodwaters with repair work being carried out by local parishioners,
- in 1980 the church was painted and renovated by the local coal mines
- between 1998 and 2002 the church was furnished with new carpet, sanctuary windows depicting a native bush theme were installed and native trees and bushes were planted, and
- in 2005 the United Collieries' donation was used to replace the roof and guttering.

St Phillips Church, with the original locally cut cedar pews, is still in use today.

In summary, St Phillips Church is a 150 year old building classified as a historic item being of regional significance. The main building materials are bricks and colorbond roofing. The building will be approximately 2190 metres from the final stage of the Project.

BULGA BRIDGE OVER WOLLOMBI BROOK

The Bulga Bridge, completed in 1912, is listed on the NSW State Heritage Register.

The bridge is a Dare type timber truss bridge and spans an overall length of 129.2m. The structure comprises two timber truss spans, each of 32.0 m, and three timber approach spans at one end and two at the opposite. Sheeted timber trestles support the super structure with a carriage way, with a minimum width of 5.5 m. A timber post and

rail guard extends the full length of the bridge. The bridge, in particular the large supporting trestles, is representative of the technical developments that were made in timber truss design by the Public Works Department. The trussed cross girders are a rare feature. In the context of its landscape it is visually attractive. As such, the bridge has moderate aesthetic significance.

The bridge has undergone some structural changes in recent years including the addition of steel tension ties in the underside of the bridge deck (see **Appendix 3** showing additional bridge reinforcements) but it remains on the State Heritage Register because of its age and method of construction.

3.2 Vibration Limits for the Historical Structures

The vibration limits currently used by other open cut mining operations, applicable to each of the Historical Structures are as follows:

- **Wambo Homestead** – Wambo Mine, immediately adjacent to the Wambo Homestead operates using a 5 mm/s vibration limit. The vibration limit of 5 mm/s is considered appropriate for the Project.
- **St Phillips Church** – Hunter Valley Operations (HVO) is one of the closest open cut coal operations to St Phillips Church. HVO operates using a 5 mm/s vibration limit (see **Appendix 4**). The same vibration limit of 5 mm/s (for St Phillips Church) is appropriate for the Project.
- **Bulga Bridge** – Bulga Bridge is defined as public infrastructure as per the Warkworth Mining Limited's Project Approval 09_0202, Schedule 1, which is defined as "*Linear and related infrastructure that provides services to the general public such as roads, railways, water supply, drainage, sewerage, gas supply, electricity, telephone, telecommunications, etc*" meaning the criteria of 50mm/s from Schedule 3 of the Project Approval would protect the Bulga Bridge.

Immediately adjacent to Bulga Bridge is the community of Bulga village. The relevant vibration limits for residences on privately owned land in the village of Bulga are 5 mm/s (applicable to 95% of blasts over a period of 12 months) and 10 mm/s (not to be exceeded). As some of the residences are within a few hundred metres of the bridge structure it is unlikely that the level of 50 mm/s for the Bulga Bridge will ever be reached

The vibration limits and estimated minimum distances from the Project's proposed final pit wall (for years 9 and 21of the operation) for each of the Historical Structures are presented in **Table 1** below.

Table 1: Vibration Limits and Minimum Distance Estimations from Critical Points

Location	Easting (m)	Northing (m)	Vibration Limit (mm/s)	Year 9 Min. Distance (m)	Year 21 Min. Distance (m)	Direction from Warkworth Extension
Wambo Homestead	311622	6393138	5	4393	3082	North-West
St Philips Church	314870	6394214	5	2390	2190	North
Bulga Bridge	314409	6385656	50	3645	2485	South-West

4. VIBRATION MODELLING

The aim of this section is to provide an indication of the vibration impact of the proposed mining activities of the Project on the Historical Structures.

The vibration predictive model used in this report is based on the previously compiled model generated for MTW. The model is based on the vibration monitoring stations located in the vicinity of Bulga village. The model is considered to be representative for the location of the Historical Structures. It should be noted that the model does not account for a possibility of the wavefront reinforcement occurring.

The site law formula is specified as follows:

$$\mathbf{V} = \mathbf{k}\left(\frac{D}{\sqrt{m}}\right)^{a}$$

Where:

V	=	Peak Particle Velocity (mm/s)
D	=	Distance from blast (m)
m	=	Charge mass per delay (kg)
a	=	Site exponent
k	=	Site constant

The model is based on the actual surface vibration measurements from various Mt Thorley blasts, and details were presented in the internal report (Terrock's Report 2000), see **Appendices 5A** and **B**. The parameters summarising the site law analysis (governing ground vibration behaviour) are specified as follows:

$$\mathbf{V} = \mathbf{1720}\left(\frac{D}{\sqrt{m}}\right)^{-1.6}$$

Where:

a	=	-1.6 (Site exponent)
k	=	1720 (Site constant)

It should be noted that the model is based on the outer data envelope, representing the "worst case scenario" (that is, based on the highest measured value).

The long term plans for the Project which were provided include snapshots of the mine extension as predicted for years 9 and 21 and show the final pit boundaries. The proposed bench sizes were reviewed to provide an indication of the thickness of the material to be blasted. The data is presented in **Table 3**. There is substantial variability in the bench heights. Three bench heights were selected to represent the range. 15, 40 and 62 metre benches were considered - 62 metres represents the maximum bench height.

Table 3: Maximum Overburden / Interburden Thickness for the North Pit

Seam	Overburden / Interburden Thickness (m)			
	STRIPS (40 – 70)			
	40	50	60	70
WYC				12
WYD				14
WYE	25	16	-	
WYF	28	24	23	45
WYG	3	4	3*	3
RCA	30	25	5	8
RCB			12	21
RCC	17	5	5	41
RCD	15		3	2
RCE	12	16	13	12
RCD	15		3	
RCE	12	16	13	
RCF	2	-	2	2
WBA	31	26	21	20
WBB	1	1	2	3
WBC	1.8	-	-	
WNA	26	-	-	
WNB	-	27	30	30
WNC	-	1	3	4
WND	3	4	4	4
BLA	3	3	2	2
BLC	0	1	1	2
BLE	16	26	29	28
BLF				1
BLG				1
BLH	4	3	2	3
GMB	41	40	39	42
GMC	15	13	32	10
GMD	6	4	2	2
WHA	6	7	8	10
WHE	-	3	2	
WHF	29	31	26	20

Seam	Overburden / Interburden Thickness (m)			
	STRIPS (40 – 70)			
	40	50	60	70
WHG	-	1	1	
WHH	3	2	2	2
WHJ	-	-	1	1
BFB	58	62	59	58
BFJ	-	-	1	1
WWA	6	6	6	6
WWE	39	32	18	21
WWF	2	1	1	2
WWG	1	1	1	2

MTW uses various blasting products. For the purpose of this report two products, one for dry (ANFO) and one for wet (Heavy ANFO) conditions, have been analysed. Six different options have therefore been considered.

The results of the modelling are presented as a series of overlying contour lines on the mining plans. Up to 9 main contours of interest were drawn for each case, including the following vibration values 0.8, 1, 1.5, 2, 3, 4, 5, 6 and 10 mm/s.

The vibration modelling for Year 21 mine expansion plans (using Heavy ANFO and worst case scenario) are shown in **Figures 2A-C.** The vibration modelling undertaken indicates the potential vibration exposure for the sites of the Historical Structures which are marked in these modelling diagrams.

The contour lines represent the extreme cases, that is, initiation of the maximum charge mass (three different cases) from the edge of the pit shell in each case (i.e. for the final pit shell for Year 21). In this instance, each contour is drawn from the edge of the proposed final pit shell.

The results of the vibration modelling for the Historical Structures are summarised in **Table 4**. Table 4 shows the maximum predicted vibration for each of the Historical Structures, depending on the bench size and blasting product used. Table 4 also highlights the blast impacts according to the Project's mine expansion plans provided for years 9 and 22.

It should be noted that below is an approximation and the results given as per the output of the modelling. Due to low vibration levels estimated, the values are presented in a one decimal place format.

Table 4: Maximum Ground Vibration Estimates for Each Place of Concern

Infrastructure	Min. Distance (m)	Estimated Max Ground Vibration (mm/s)					
		15 m Bench		40 m Bench		62 m Bench	
		ANFO 481 kg	Heavy ANFO 722 kg	ANFO 1626 kg	Heavy ANFO 2439 kg	ANFO 2565 kg	Heavy ANFO 3848 kg
Year 9							
Wambo Homestead	4393	0.4	0.5	1.0	1.3	1.4	1.9
St Philips Church	2390	1.0	1.3	2.5	3.5	3.6	5.0
Bulga Bridge	3645	0.5	0.7	1.3	1.8	1.8	2.5
Year 21							
Wambo Homestead	3082	0.6	0.9	1.7	2.3	2.4	3.3
St Philips Church	2190	1.1	1.5	2.9	4.0	4.2	5.7
Bulga Bridge	2485	0.9	1.2	2.4	4.1	3.4	4.7

The results of the vibration modelling are summarised as follows:

- for the 15 metre bench size
  - using Year 9 pit contours the predicted vibrations are in the order of 0.4 – 1.3 mm/s
  - using Year 21 pit contours the predicted vibrations are in the order of 0.6 – 1.5 mm/s
- for the 40 metre bench size
  - using Year 9 pit contours the predicted vibrations are in the order of 1.0 – 3.5 mm/s
  - using Year 21 pit contours the predicted vibrations are in the order of 1.7 – 4.1 mm/s
- for the 62 metre bench size
  - using Year 9 pit contours the predicted vibrations are in the order of 1.4 – 5.0 mm/s
  - using Year 21 pit contours the predicted vibrations are in the order of 2.4 – 5.7 mm/s

These results show that low vibration levels are expected for all three sites of Historical Structures when using 15 or 40 metre bench size. Such vibration exposure is within the imposed limits and is too low to produce damage to any of the Historical Structures.

The maximum 62 metre bench simulation generates higher vibration levels; borderline or exceeding the 5 mm/s limit. Therefore, to comply with the vibration limits to ensure

safety of the Historical Structures, in particular St Phillips Church, some control measures, such as deck charges or smaller bench heights will be required.

The modelling undertaken is conservative and provides the worst case scenario. As the MTW mine progresses to the West, smaller explosive charges (i.e. deck charges) or smaller bench sizes will be required to reduce the charge mass to ensure the 5 mm/s vibration limit imposed for the Bulga and Warkworth village residences are not exceeded.

5. CONCLUSIONS AND RECOMMENDATIONS

At the request of MTW an assessment of the impact of blasting from the Project on the Historical Structures was undertaken. The assessment was requested as part of the requirement under the Project Approval to include a Blast Management Plan which incorporates a monitoring program for evaluating the performance of the Project, including any blasting impacts on the Historical Structures (see Schedule 3, Condition 20 (e) of the Project Approval). The three Historical Structures, Wambo Homestead, St Phillips Church and Bulga Bridge, were assessed in terms of potential vibration impact.

The study has been supported by a review of relevant documentation, including existing vibration limits, proposed extraction plans, blast design details and a site visit undertaken on 22 May 2012 by ESC's principal consultant.

Based on the results of this assessment the following conclusions were reached:

- The vibration limits were identified as 5 mm/s for the Wambo Homestead and St Phillips Church and 50 mm/s for the Bulga Bridge
- The major risk identified is vibration exposure and related damage. The risk is dependent upon the charge mass and distance from the blasting area. The assessment included detailed blast impact analyses and vibration modelling using various blasting scenarios.
- The minimum distances from each of the Historical Structures to the final pit wall (Year 21) were estimated as follows:
    - Warkworth Homestead – 3082 metres,
    - St. Phillips Church – 2190 metres, and
    - Bulga Bridge – 2485 metres.
- The 15 metre bench vibration simulation predicted vibration levels in the order of 0.4 – 1.3 mm/s for Year 9 and 0.6 - 1.5 mm/s for the Year 21 pit boundaries. Lower vibration levels are expected if smaller than 15 metre benches are used. There would be no risk of damage related to such vibration exposure for any of the Historical Structures.

- The 40 metre bench vibration modelling indicated the maximum estimated vibration impact for the Historical Structures is in the order of 1.0 – 3.5 mm/s and 1.7 – 4.1 mm/s for year 9 and 21 pit boundaries respectively. Similar to the 15 metre bench, the vibration simulations for blasting with a 40 metre bench height revealed that there are no risks related to such vibration exposure for any of the Historical Structures.
- The maximum 62 metre bench simulation (potentially to be used as part of the Project) revealed that the maximum estimated vibration levels for the Historical Structures are in the order of 1.4 – 5.0 mm/s and 2.4 – 5.7 mm/s for the Year 9 and Year 21 pit boundaries respectively. To ensure the vibration limit (i.e. 5 mm/s) is not exceeded (particularly for St Phillips Church) the introduction of some control measures, such as deck charges or smaller bench heights, will be required.
- The study did not identify any major risks from blast vibration exposure, with the exception of the use of high bench sizes (i.e. 62 metres benches). The author acknowledges however that this point will be sufficiently covered by other limits, such as the 5 mm/s vibration limit imposed on private residences. The easiest and most practical solution is to introduce the internal (target) vibration limit set below the 5 mm/s vibration level which should minimise the risk of exceedance.
- Based on the modelling undertaken there is no risk of damage due to vibration exposure for any of the Historical Structures, for bench sizes up to 40 metres high (see Table 4 for the corresponding charge masses).
- To ensure that the mine complies with the vibration limits it is recommended that an ongoing vibration monitoring program is implemented. Permanent vibration monitoring stations should be installed at the three Historical Structures. This monitoring program should involve monitoring stations which represent vibration levels at the heritage structures. In addition, it is recommended that MTW undertakes monitoring of the structural conditions by completing a baseline dilapidation survey of St Phillip's Church and additional survey if the representative monitor records ground vibration significantly higher than 5 mm/s.
- When blasting within 3000 metres of the Historical Structures it is recommended that MTW undertakes detailed vibration modelling for critical blasts to ensure vibration limits are not exceeded. The vibration modelling is to include vibration predictions and other factors such as wavefront reinforcement impact. In case of vibration limit exceedance a structural damage assessment of the structure is recommended, followed by appropriate reporting.

Thomas Lewandowski
27th June 2012

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FIGURES

FIGURE 1A – Proposed Mine Plans – Year 9

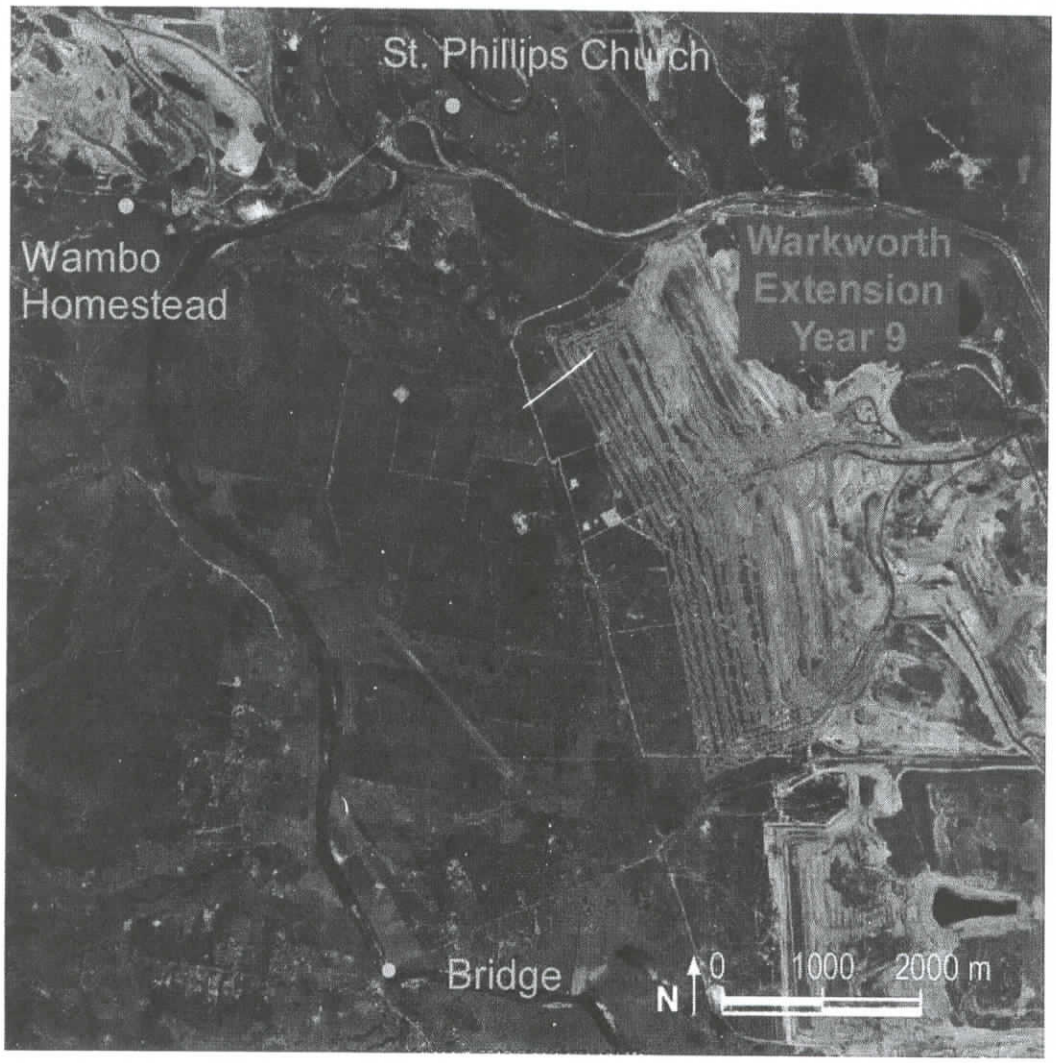


FIGURE 1B – Proposed Mine Plans – Year 21

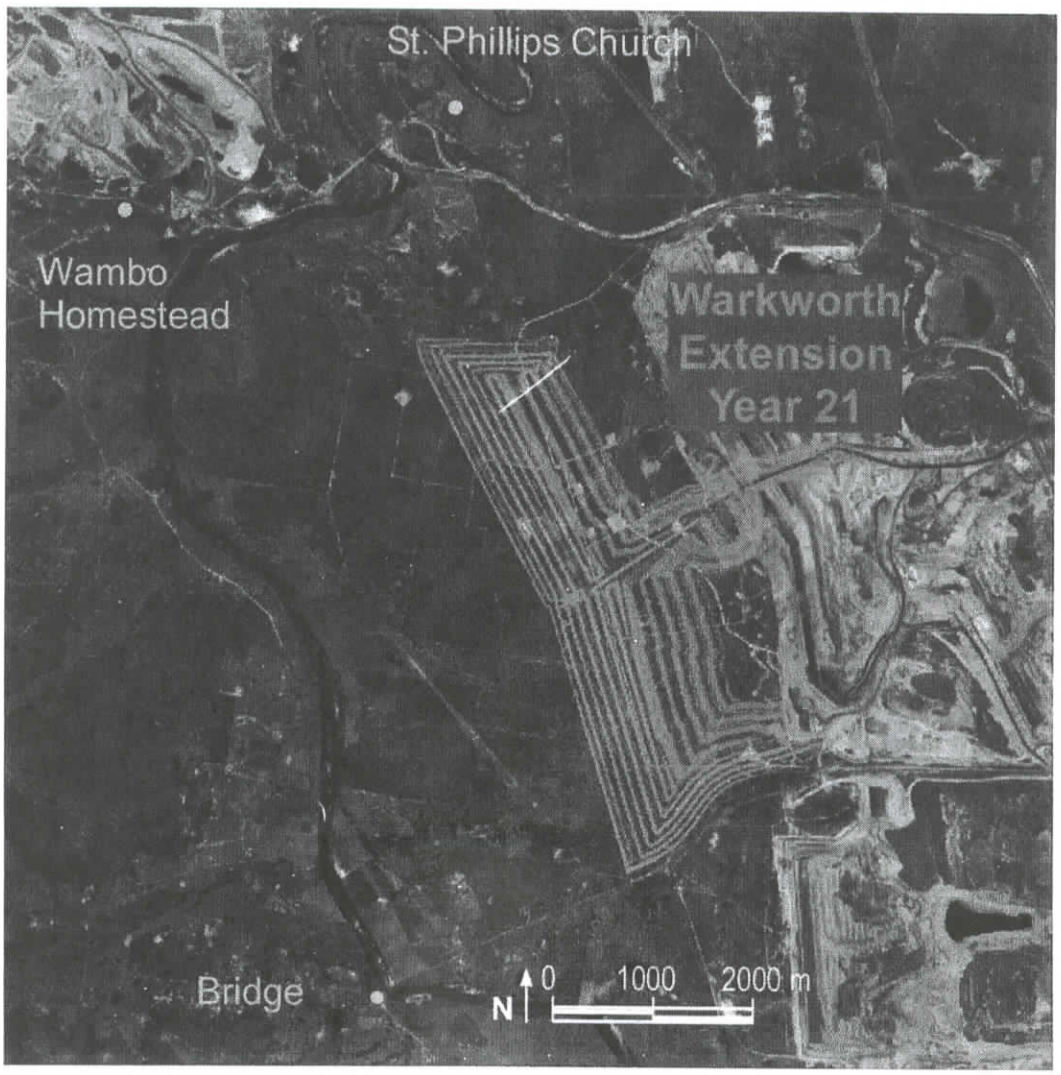


FIGURE 2A – Ground vibration Modelling – Year 21; 15m Bench, MIC 722 kg, Heavy ANFO

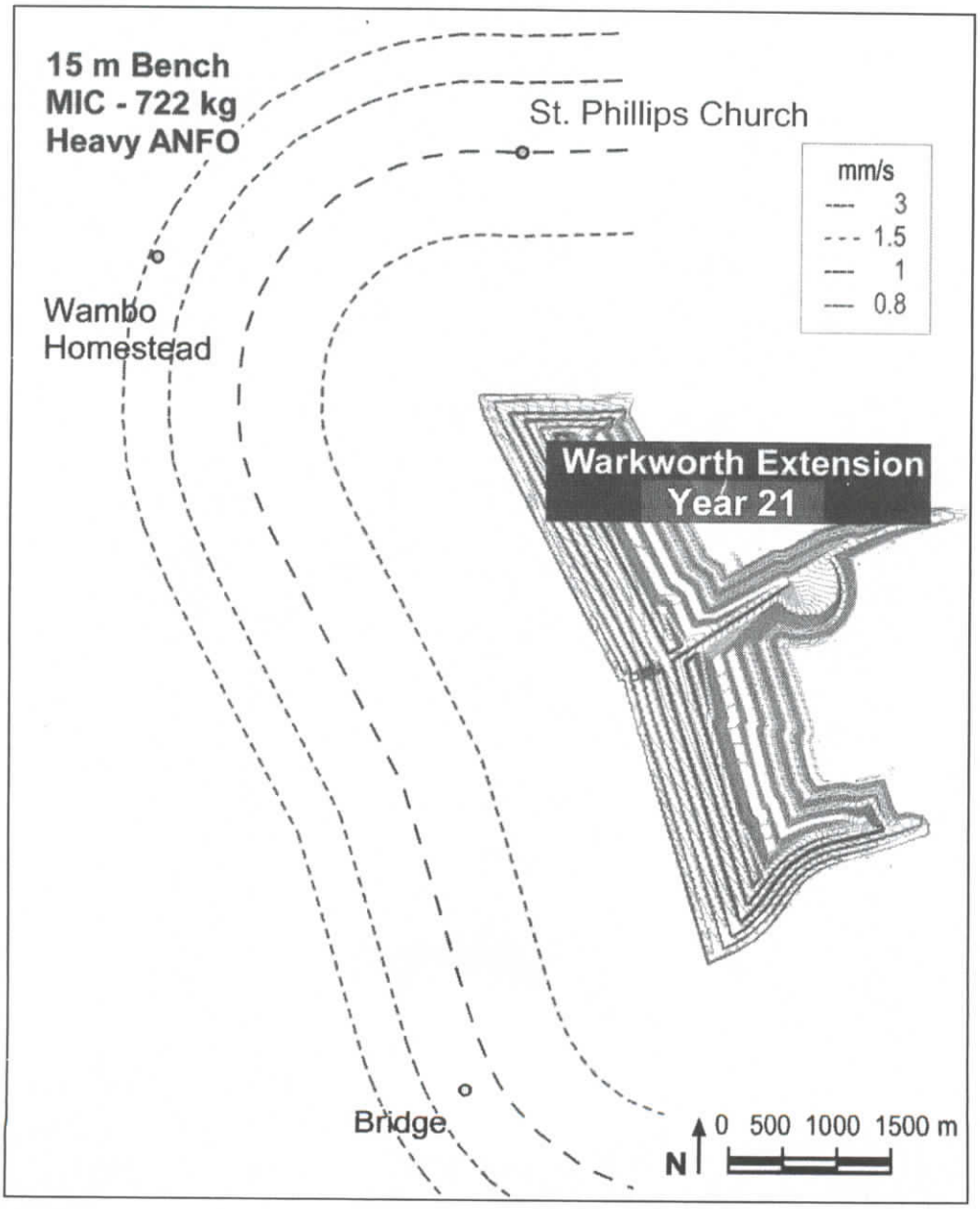


FIGURE 2B – Ground vibration Modelling – Year 21; 40m Bench, MIC 2439 kg, Heavy ANFO

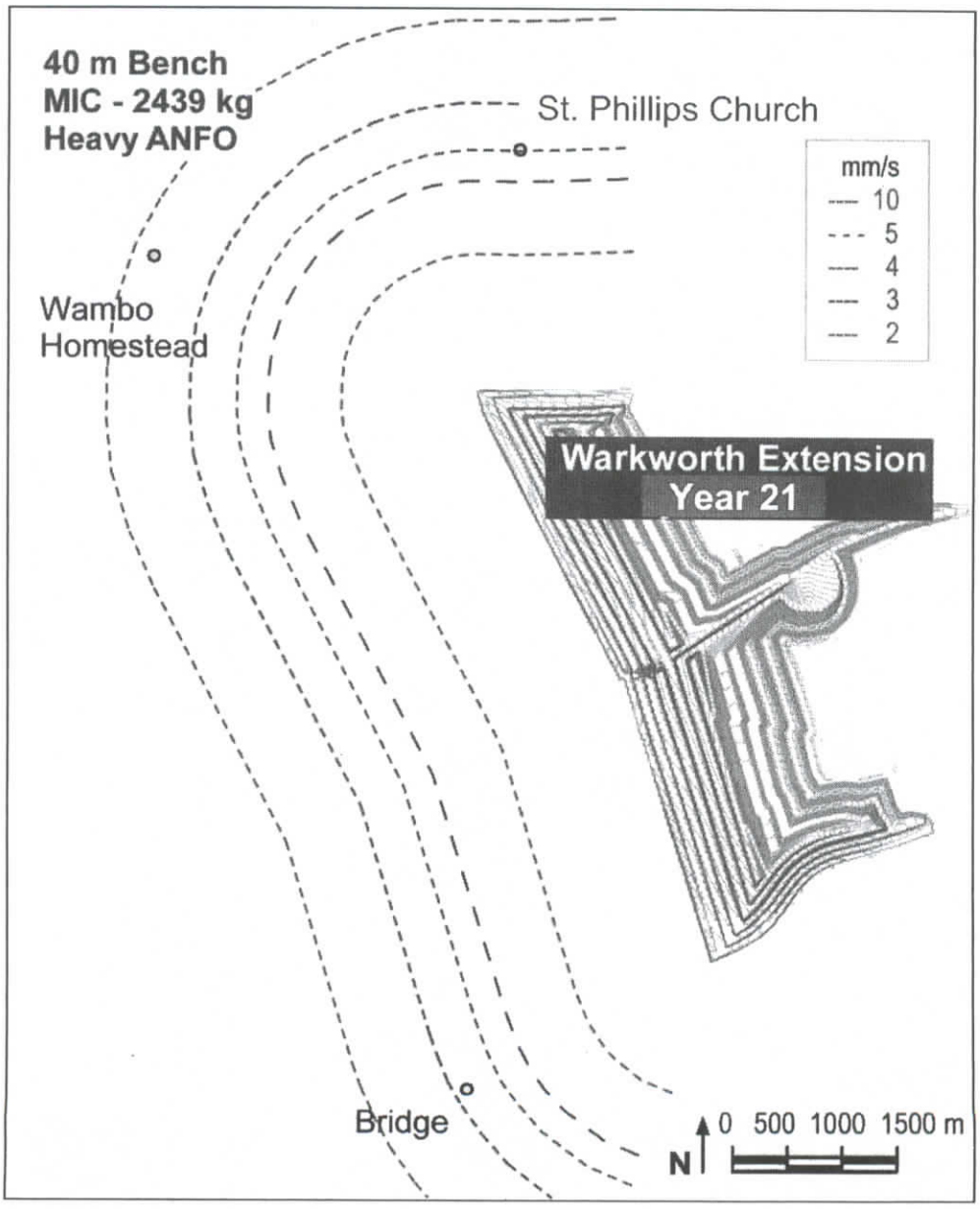
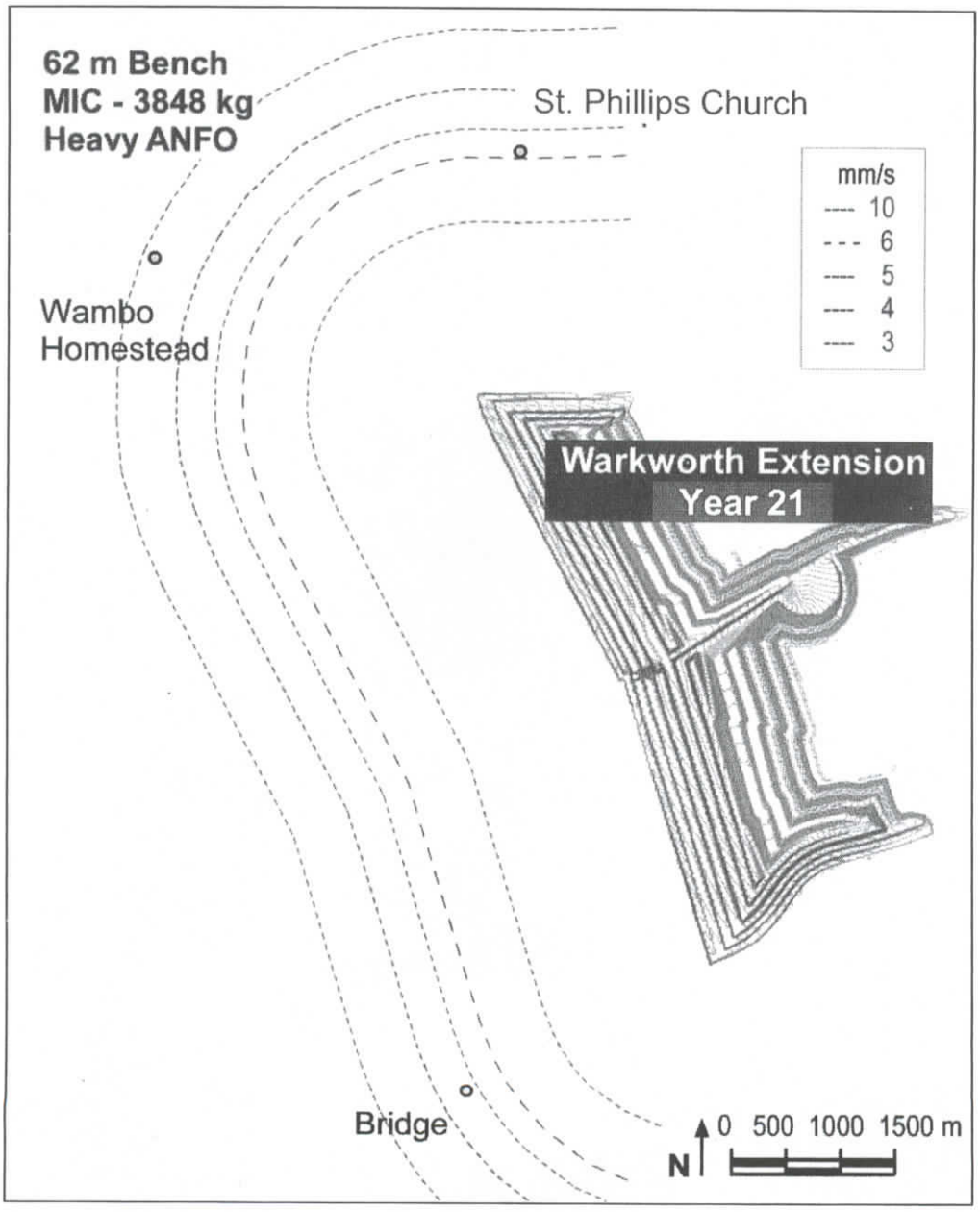
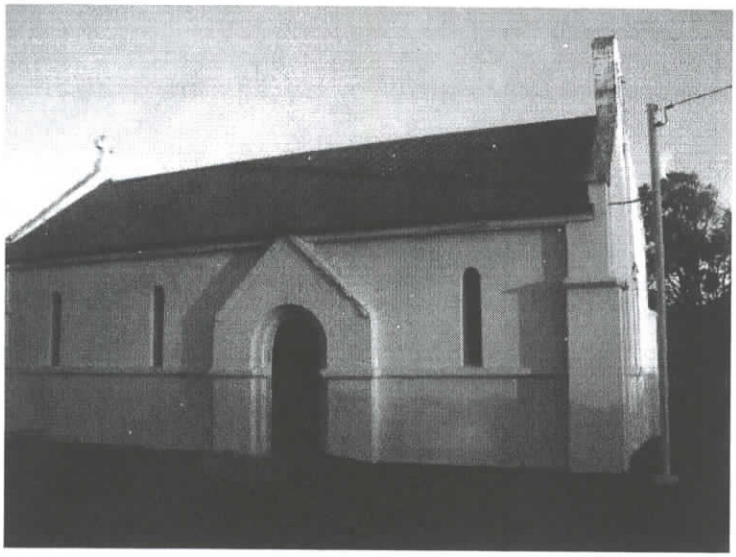


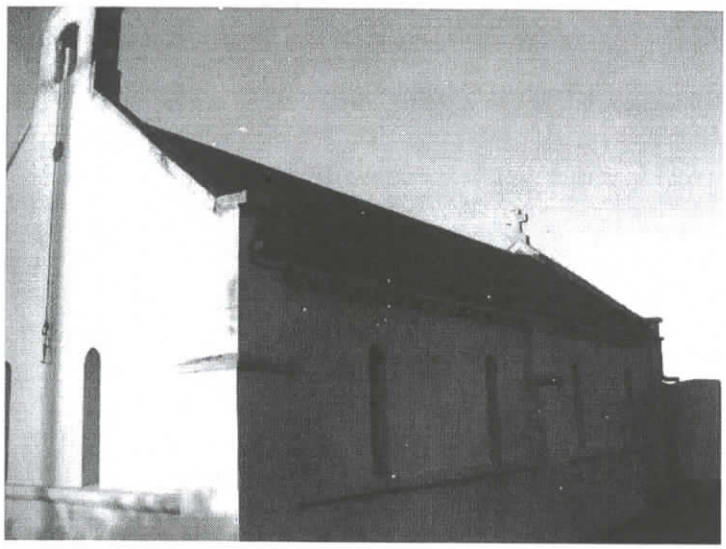
FIGURE 2C – Ground vibration Modelling – Year 21; 62m Bench, MIC 3848 kg, Heavy ANFO

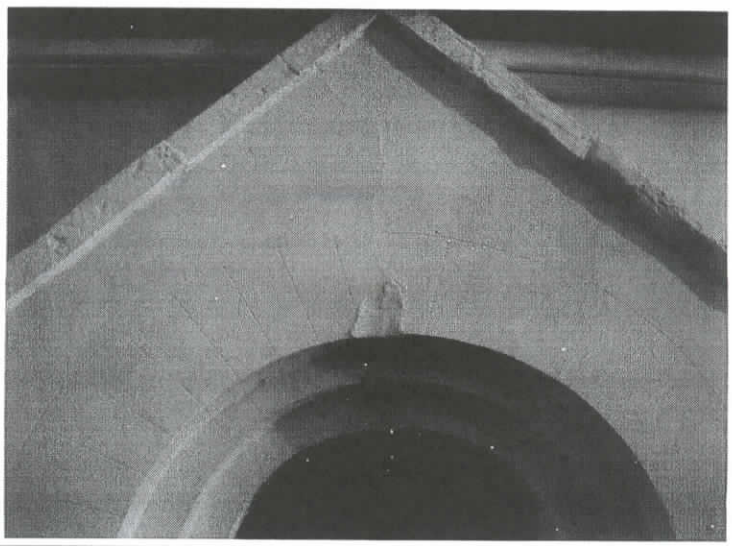


APPENDICES

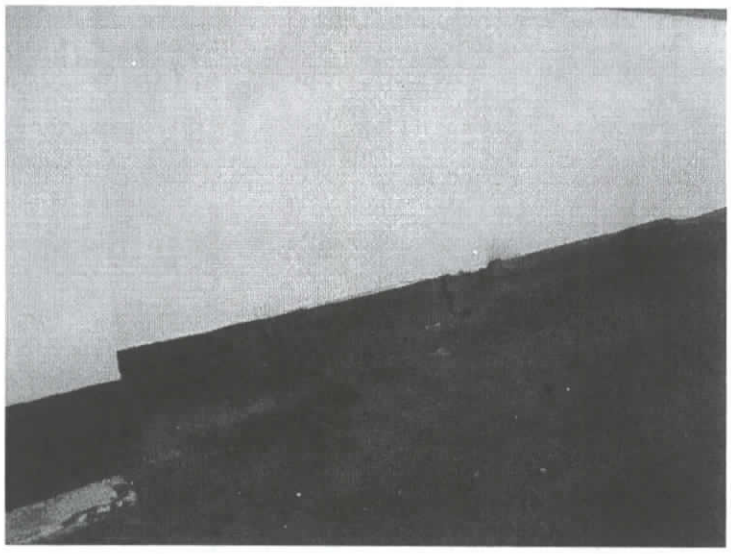
APPENDIX 1 – St Phillips Church

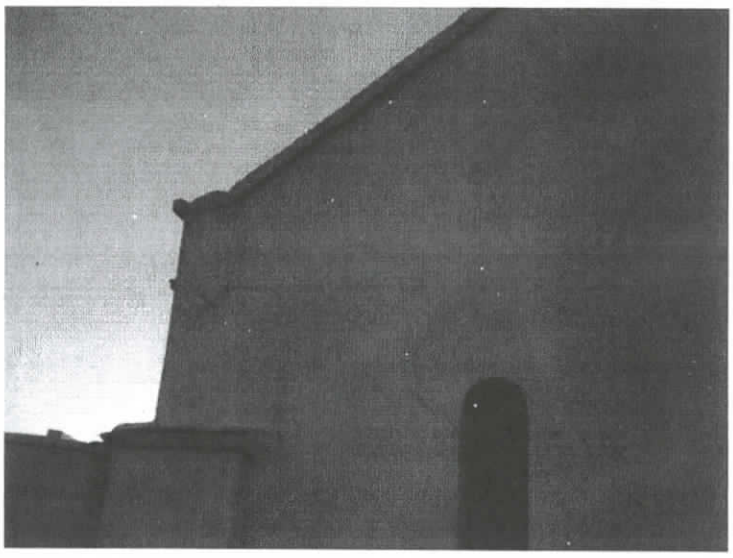


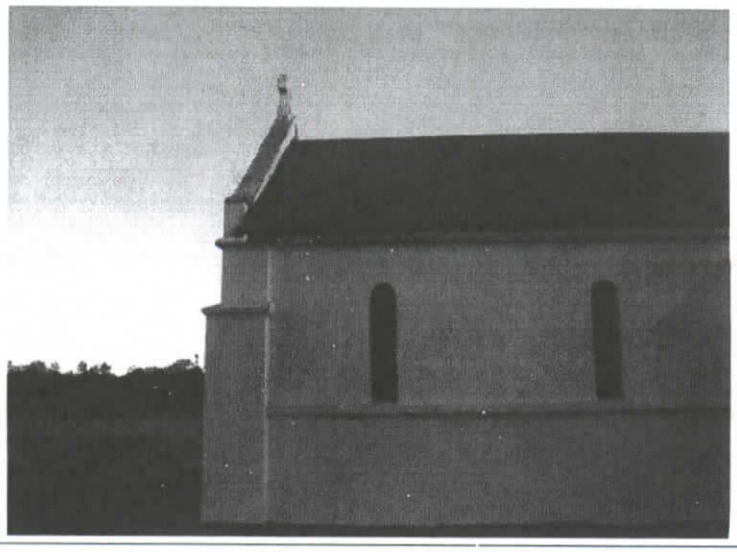




APPENDIX 1 – St Phillips Church (continued)







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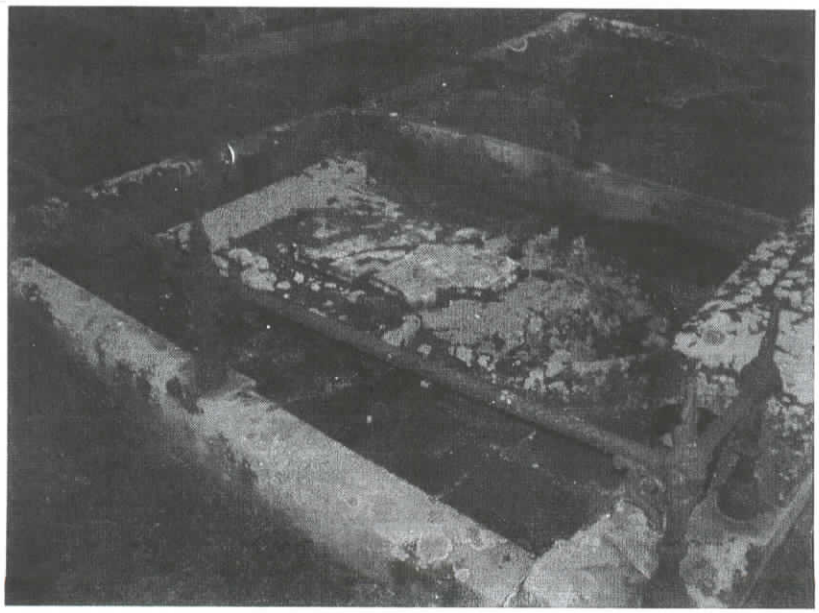
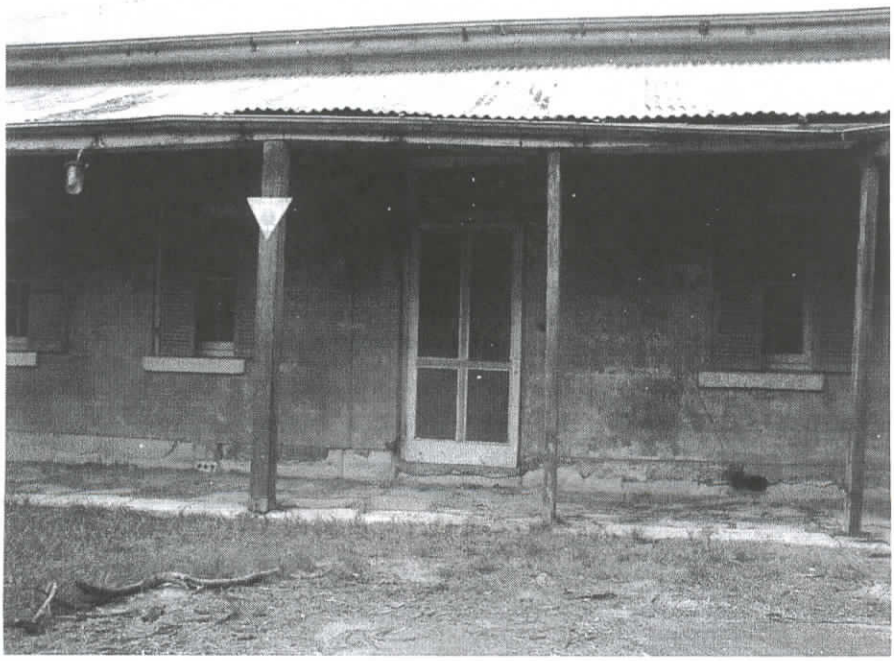
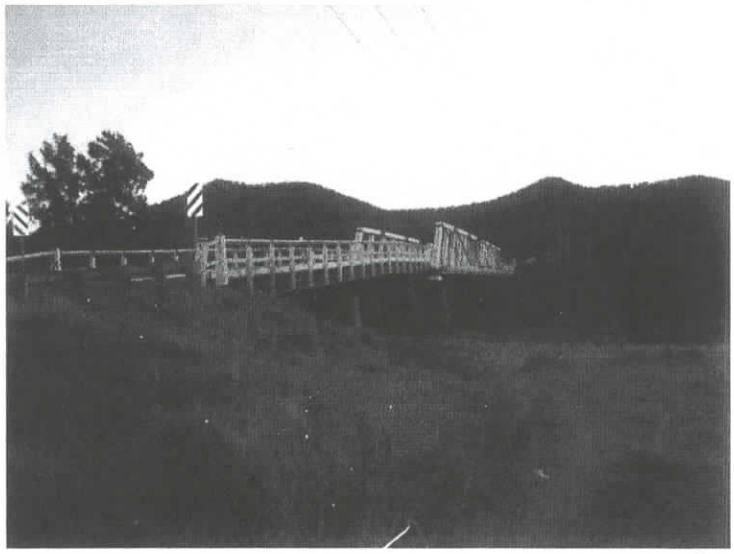


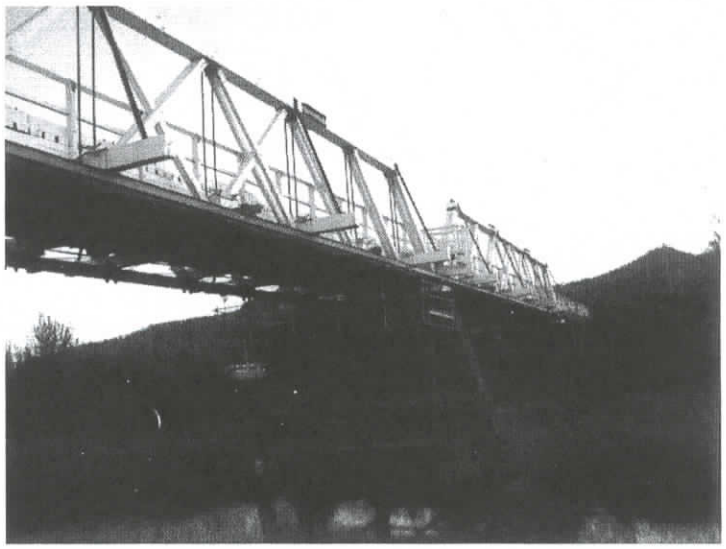
APPENDIX 2 – Wambo Homestead

APPENDIX 2 – Wambo Homestead (continued)



APPENDIX 3 – Bulga Bridge





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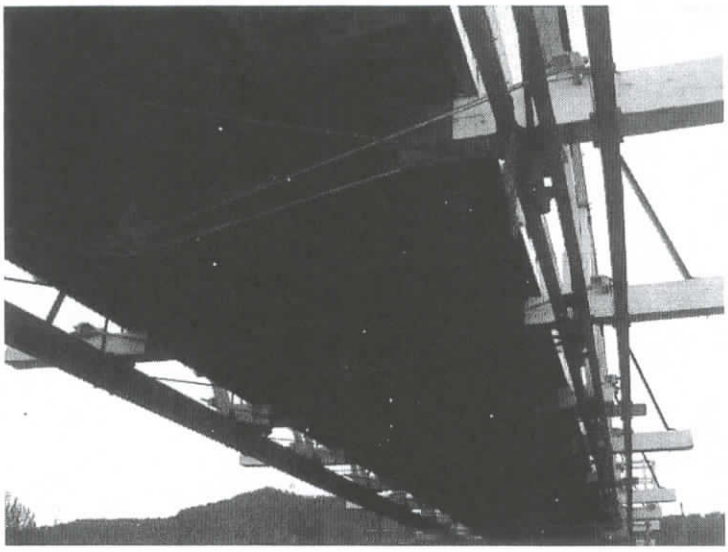
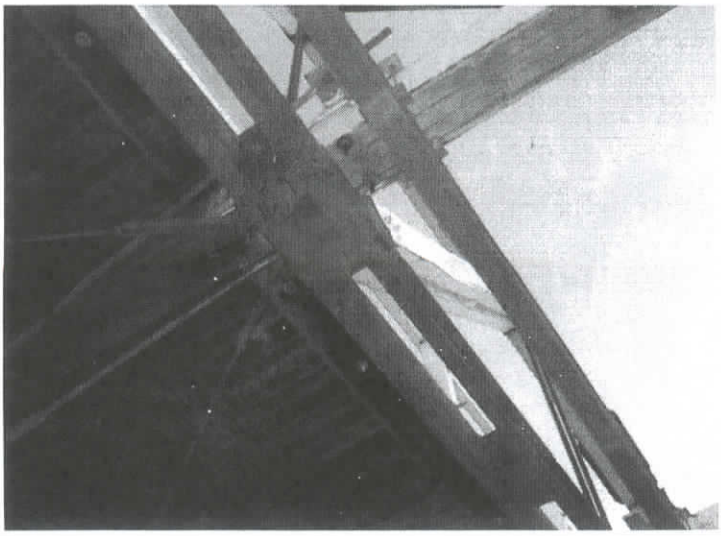




APPENDIX 4A – Protocol for Evaluating Blast and Vibration Compliance (after Coal and Allied HVO Environmental Monitoring Programme Document)

3 MONITORING

Blasts are monitored with the Datamasters V6 Blast Monitoring System. This system consists of blast monitoring stations in the field that are connected by wireless technology to an automated management system based at Datamasters office.

Blast results are automatically retrieved from the field stations, collated, reviewed and published to Datamasters web site where they are accessed by Coal & Allied users.

The monitoring stations are designed, operated, maintained and calibrated by Datamasters in accordance with the manufacturer's requirements and the requirements of AS 2187.2- 2006 'Storage and Use of Explosives'.

Blast monitoring is conducted at 7 locations around HVO as detailed in the HVO Blast Monitoring Programme. Monitoring will be undertaken in accordance with Australian Standard AS 2187.2- 2006 and Coal & Allied's environment procedures EP9.2 Blasting and EP1.10 Monitoring and Measurement.

Real-time meteorological data will be collected in relation to blast monitoring data. This information shall include wind speed direction and temperature inversions (where applicable at the site).

Air overpressure and vibration associated with blasting shall be recorded for each blast. Monitoring data shall be reviewed by the Drill and Blast Engineer as soon as practicable after each blast.

Any blast exceeding the impact assessment criteria (Tables 2 & 3) shall be referred for additional analysis and interpretation by an external specialist in blast consulting where the reason for the levels cannot be established by the Drill & Blast Engineer. An external report shall be issued within 7 days. This investigation will review blast monitoring results, blast parameters, location and prevailing weather conditions. The investigation analysis is specific to each individual exceedance but may include wavetrace inspection, wavefront pattern analysis, regression analysis, meteorological effect analysis etc. The results of any blast exceeding the impact assessment criteria will be reported to the Department of Environment, Climate Change and Water (DECCW) within 24 hours of the blast occurring.

4 APPROVAL & CRITERIA

5.1 Current Approvals

HVO is the combined operations of the West Pit, Mitchell Pit and Camington Pit situated to the north of the Hunter River, and Cheshunt Pit, Riverview Pit, Hunter Valley South Pit and South Lemington Pits situated south of the Hunter River. Air quality impacts around HVO are addressed in the following two most recent project approvals details in Table 1.

Table 1 APPLICABLE CONSENTS FOR HVO

Consent Area	Consent	Applicable Pits
South Pit Area	Hunter Valley Operations South Coal Project, Project Application 06_0261	Riverview Pit (South Pit) Cheshunt Pit South Lemington Pits
West Pit Area	HVO West Pit Extension Development Applications 450-10-2003 (including 2006 modification)	West Pit Camington Pit North Pit

APPENDIX 4B – Protocol for Evaluating Blast and Vibration Compliance (Continuation)

Blasting impacts must be assessed against each of the project approvals. Accordingly, the limits and conditions specified in these documents will be used to assess the performance of HVO with regard to blasting.

5.2 Impact Assessment Criteria

Impact assessment criteria for blasting are provided in Table 2 and Table 3 below. These criteria apply to all blast monitoring locations at HVO.

Table 2 AIRBLAST OVERPRESSURE IMPACT ASSESSMENT CRITIERIA

Airblast overpressure level (dB (Lin Peak))	Allowable exceedance
115	5% of the total number of blasts in a 12 month period
120	0%

Table 3 GROUND VIBRATION IMPACT ASSESSMENT CRITIERIA

Peak particle velocity (mm/s)	Allowable exceedance
5	5% of the total number of blasts in a 12 month period
10	0%

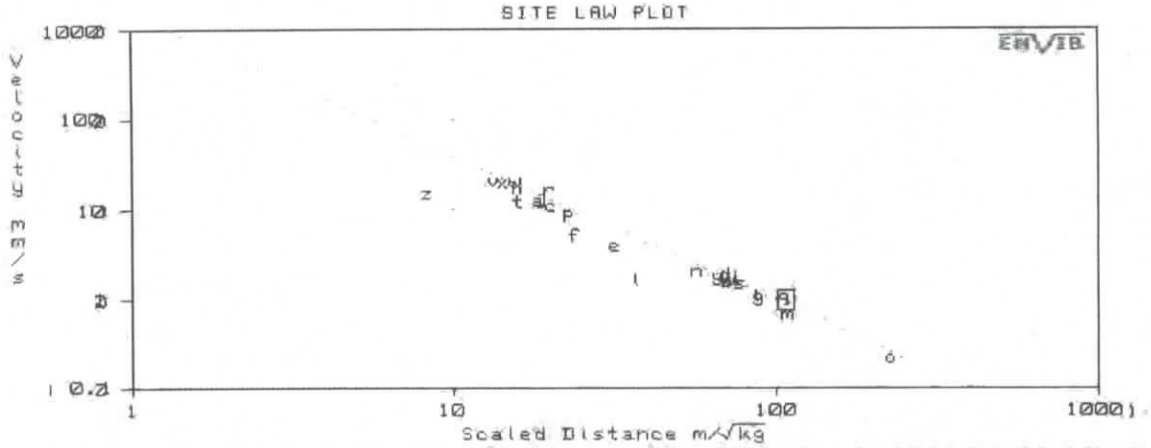
An additional ground vibration impact assessment criterion applies to the HVO South Project: *"For St Phillip's Church and the outbuildings at Archerfield, the Proponent shall ensure that ground vibration peak particle velocity generated by the project does not exceed 5mm/s, or as otherwise approved by the Director General".*

5 REPORTING

A summary of blast monitoring results will be reported quarterly on Coal & Allied's web site www.coalandallied.com.au

An analysis and summary of blast monitoring results will be reported in the Annual Environmental Management Report.

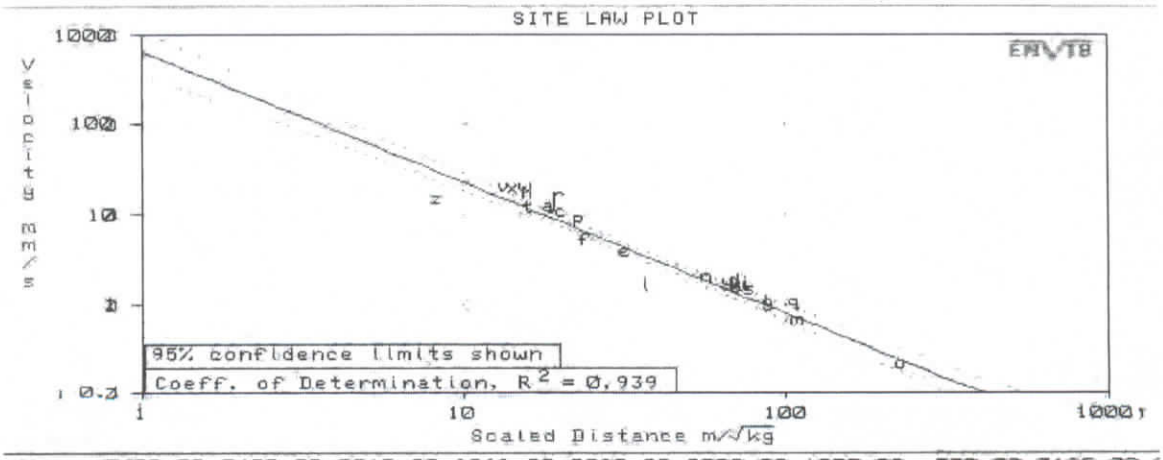
APPENDIX 5A – Site Law Analysis using Outer Data Envelope (after Terrock 2000)



Char:	3400.00	3400.00	3517.00	2569.00	3090.00	3300.00	1533.00	300.00	3195.00
Dist:	1058.00	4144.00	4123.00	1204.00	877.00	1070.00	1448.00	985.00	1287.00
Vel:	11.94	1.47	1.77	4.96	16.19	12.17	1.56	1.92	8.39
Symb:	a	b	d	f	h	j	l	n	p

exponent = -1.60 constant = 1720

APPENDIX 5B – Site Law Analysis for 95% confidence Line (after Terrock 2000)



Char:	3400.00	3400.00	3517.00	2569.00	3090.00	3300.00	1533.00	300.00	3195.00
Dist:	1058.00	4144.00	4123.00	1204.00	877.00	1070.00	1448.00	985.00	1287.00
Vel:	11.94	1.47	1.77	4.96	16.19	12.17	1.56	1.92	8.39
Symb:	a	b	d	f	h	j	l	n	p

exponent = -1.46 (-1.31 to -1.60) constant = 715 (409 to 12

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Appendix E - Post Blast Fume Generation Mitigation and Management Plan

Mount Thorley Warkworth:

Post Blast Fume Generation

Mitigation and Management Plan

COAL & ALLIED

Managed by Rio Tinto Coal Australia

Edition: Revised
Date: July 2012

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1. Introduction

This document has been prepared to provide a protocol for the mitigation and management of post blast NOx fumes from blasting operations at Mount Thorley Warkworth (MTW) and is based on the AEISG Code of Practice (2011). This provides the basis on which to make blasting decisions to minimise the incident and severity of post blast fume events at MTW.

Figure 1: MTW Operations & local communities

2. NOx Fume

All blasting explosives produce large volumes of gas in very short time span (milliseconds).

The application of ammonium nitrate based blasting explosives in the field, under variable conditions, can lead to non-ideal explosive reactions and the production of Nitric oxide (NO) and Nitrogen dioxide (NO_2). Nitric oxide is unstable in air and readily oxidises to nitrogen dioxide. Nitrogen dioxide is identifiable by the generation of orange/brown clouds.

3. The causes of fume in blasting

Fumes are generated as a result of an explosive not reacting with a full, high order, steady state detonation. The causes of this are many and variable. This protocol groups causes into categories and further identifies controls that are best able to control the variable. The seven main categories that contribute to post blast fume are listed below in the order in which they are encountered in the mining process:

1. Geological conditions
2. Climate/seasonality.
3. Blast design.
4. Explosive product selection.
5. Explosive quality.
6. Contamination of explosive in the blast-hole.
7. On-bench practices.

4. Identification of persons to prevent fumes

This section identifies the persons in the organisation and their role in relation to ensuring post blast fume from blasts is minimised.

- Drill and Blast Superintendent
- Mine Operations Planner
- Geologist
- Drill & Blast Engineer
- Drill Supervisor
- Drill Operator
- Shotfiring and Pumps Supervisor
- Shotfirer
- Traffic Road Runner
- Trainee Shotfirer / Shotfirer Assistant
- MMU Operator
- Explosives Manufacturer/Supplier

Person	Role	Responsibilities/Remarks
Drill and Blast Superintendent	Manage all drill and blast operations for the site.	Incorporation of process steps and hazards related to blast fume into Standard Operating Procedures for drilling, charging, stemming, blast guarding, post blast inspection Adequate resourcing of blasting activities. Reporting on the tracking of fume ratings to mine management Resolve any environmental blast permissions issues Risk review for extended fume management zone Escalate fume events to the appropriate level and team within RTCA.
Mine Operations Planner	Plan the mine/pit operations to extract coal	Design extraction plan to minimise those blasting activities such as box cuts or blast areas that do not have a free face. Designs to consider separate removal of softer weathered horizons
Geologist	Provide data on ground conditions to assist blast designer with shot design	Accurate provision of ground data across the proposed shot. Geology & rock mass conditions.

Drill and Blast Engineer	Design a blast to provide good extraction of material while manage blasting hazards	Maintenance of the site Blast Management Plan Maintain site design matrices, charging rules, procedures and workflow for design Conduct preload risk rating Blast design to consider: • Conduct preload risk rating • Explosive product selection appropriate to ground and water conditions. • Geology & rock mass conditions. • Historical blast performance for the current area. • Weather conditions during loading and firing. Conduct prefire risk rating Assist with risk review for extended fume management zone Capture blast videos; to be kept for at least one year. Measure post blast fume concentrations and refine site fume site-law (under development) Post blast assessment and blast fume records including most likely cause of fume event and potential control measures. Records to be kept for 4 years
Drill Supervisor	Supervise drill activities on the bench.	Conduit between drill activity and Drill & Blast Engineer. Bench preparation prior to drilling.
Drill Operator	To provide drilled holes for the loading of explosives for a shot.	Accurately drill the shot plan and report variations. Report anomalous ground conditions to drill supervisor and/or Drill and Blast Engineer Collar protection of holes.

Shotfiring and Pumps Supervisor	Manage day to day blasting operations and bench dewatering as required	Competence of blast team – including fume management training Review the use of products appropriate to conditions. Review actual loaded condition of blast prior to shot being fired. Compliance check of on bench activity. On bench water management. Notification of blast activities to affected teams Assist with risk review for extended fume management zone Report all fume events to the area Superintendent.
Shotfirer	Manage all explosives activities on bench.	Supervision of Trainee Shotfirer Compliance with design. Notify any variations from design. Recording explosive use data. Supervision of loading technique; • Preventing contamination of the explosive column. • Stemming. • Accurate placement of gas bags. • Monitor product usage during loading Manage MMU's on bench operations; • Ensuring QC density checks completed. • Hose handling for pumped products. Conduit between on-bench and blast supervisor. Identifying and reporting hole slumping. Assist with risk review for extended fume management zone Checking blasting permissions page prior to firing to ensure favourable conditions. Initiate emergency if fume travels beyond fume management zone Blast assessment against blast fume scale rate and record the fume characteristics of all shots using the AESIG fume rating system (even where there is no visible fume).

Traffic Road runner	Manage road closure activities under direction of shotfirer	Measure post blast fume concentrations to ensure roadway safe If fume migrates from the fume management zone, monitor travel path and if possible measure concentration level. In the event of impending fume event assist with distribution of "fume event protocol" for vehicles stopped for road closure
Trainee Shotfirer / Shot firer Assistant	Support Shotfiring activities On bench activities as directed by the Shotfirer	Measuring the depth of holes. Identifying water conditions down hole prior to loading. Positioning of primers in blast holes. Accurate placement of gas bags. Identifying hole slumping.
MMU Operator	Manufacture blasting explosives On bench activities as directed by the Shotfirer	Compliance with Shotfirers loading instructions. MMU Calibration. Adequate and correct process chemicals. Manufacture QC checks. Generate delivery/production records. Comply with system for effective stock rotation of AN prill and emulsion
Explosives manufacturer/ Supplier	Provide explosives fit for purpose	Manufacturing equipment compliance Provision of precursors and formulation to ensure minimum amount of fume. Change management of formulation to ensure fumes are minimised in product. Design, calibration and operation of explosives manufacturing equipment to deliver consistent explosives within specification. Provide recommendations for product use and training as required. Share best practices or learning relating to fume management. Develop, maintain and improve an explosives quality assurance and quality control programme.

5. Causes & Control Matrix

The following matrix covers each potential causes and situations that may contribute to fume generation, identified in section 3 of this protocol. For each potential cause, a likely indicator and control measure is outlined.

Primary Cause 1: Geological conditions		
Potential Cause	Likely indicators	Control measures
Blasting in weak/soft strata (Incorrect Timing and Pattern Design)	• Specific areas known to contain weak/soft strata only • Excessive Powder Factor	Understand geology of each shot and design blast (timing and explosive product) to ensure adequate relief in weak/soft strata, for example incorporation of a free face, reduction of powder factor, modified timing and increased stemming.
Explosive product seeping into cracks	• Slumping • Specific areas known to contain a high incidence of faulted/fractured ground only • Not achieving designed collar height when loading as per load sheet	Consider manufacturer's recommendations on explosive product selection
		Consider use of blast hole liners or bag off above cracking
		Record and monitor blast holes which have slumped or require excessive explosive product to reach stemming height, but where water is not present
Dynamic water in holes	• Slumped blast holes • Usually when using non water-resistant explosive products	Minimise sleep time of shot
		Consider manufacturer's recommendations on explosive product selection
		Understand hydrology of pit and plan blasting to avoid interaction between explosives and dynamic water (either natural or from other pit operations) Check after pumping to understand recharge rate of the drill hole.

Moisture in clay	• When clay or clay rich strata present	If the drill holes are defined as wet, then water resistant explosive products with appropriate energy will be used in the loading of these holes.
Blast hole deterioration between drilling and loading	• Traceable to specific geological areas • Dipped depth inconsistent with drilled depth indicating hole collapse	Minimise time between drilling and loading
		Use hole savers
		Drill and Blast Engineer to ensure benches are unaffected by backbreak from earlier blasts, for example presplits, buffers etc.
		Optimise drilling practices to minimise hole damage.
Ground movement	• Horizon offset (bench, etc.) • Area previously known for misfires	Design sequence timing to prevent hole movement and dislocation of explosives columns.

Primary Cause 2: Climate / seasonality		
Potential Cause	Likely indicators	Control measures
Rainfall on a sleeping shot.	• Excessive rainfall • Slumping of holes • Ponding of water on pattern	Review rainfall forecasts for planned sleep time of shot and select explosive products according to manufacturer's recommendations.
		Minimise sleep time for dry blast hole explosive products if rain is predicted. Consider early firing of blast.
		Bench design for water runoff with appropriate bunding & drainage.
		If a large rain event is predicted to impact on a live shot, than the top of blast holes will be protected to prevent water ingress by constructing contour drains to divert water away from hole collars with an excavator.
		Consider removing water affected product.
		Loaded drill holes are to be inspected for slumping prior to initiation after a rainfall event.

Primary Cause 3: Blast Design		
Potential Cause	Likely indicators	Control measures
Explosive desensitisation due to the blast hole depth	• In deep holes only	Reduce bench height
		Ensure adequate relief in deep holes
		Consider manufacturer's recommendations on explosive product selection and blast design for deep holes
Inappropriate priming and/or placement	• Residue product	Consider manufacturer's recommendations on explosive product initiation, in general, top and bottom priming in holes greater than 15m deep.
Inter-hole explosive desensitisation	• Blast holes drilled closer together than planned • Blast hole deviation differs greatly from planned	Review the design and adjust for actual drilling
		Review product selection and adjust for new design
Intra-hole explosive desensitisation in decked blast holes	• When using decks only	Appropriate separation of explosive decks. Initiator timing.
Excessive confinement (Incorrect Timing and Pattern Design)	• Specific to blasts known to be confined • No free face present • Excessive Powder Factor	Understand geology of each shot and design blast (timing and explosive product) to ensure adequate relief in all strata. Consider incorporation of a free face, reduction of powder factor, modified timing, depth of blast, etc.

Primary Cause 4: Explosive product selection		
Potential Cause	Likely indicators	Control measures
Non water-resistant explosive products loaded into wet or dewatered holes	• Blasts containing wet/dewatered blast holes only	Consider manufacturer's recommendations on explosive product selection
		Education of bench crew on explosive product recommendations from current supplier
		Discipline in on-bench practices Follow load sheet
Excessive energy in strata desensitising adjacent explosive product columns	• Specific to areas known to contain weak/soft strata only	Understand geology of each shot and design blast (timing and explosive product) to match, for example reduction of powder factor.
		Consider manufacturer's recommendations on explosive product selection
		Obtain appropriate technical assistance if required to ensure optimal result
Primer of insufficient strength to initiate explosive column	• For blasts using a particular primer type / size	Consider manufacturer's recommendations on compatibility of initiating systems with explosives
Desensitisation of explosive column from in-hole detonating cord initiation	In areas where in-hole cord initiation is used	Consider manufacturer's recommendations on compatibility of initiating systems with explosives

Primary Cause 5: Explosive quality		
Potential Cause	Likely indicators	Control measures
Explosive product incorrectly formulated	• All areas associated with loading from a specific delivery system • Product appearance abnormal	Explosives formulated by supplier to an appropriate oxygen balance to minimise the likelihood of post-blast fume Development and maintenance of an explosive QA/QC programme.
Inadequate mixing of raw materials	• In all areas associated with loading from a specific delivery system • Product appearance abnormal	Visual check
		Density check MMU Calibration check

Delivery system metering incorrectly (on bench incorrect manufacture of product)	• All blasts and all locations utilising explosive product(s) that incorporate a specific precursor	Regular calibration of MMU Quality control of explosive products conducted in accordance with manufacturer's recommendations
Explosive precursors not manufactured or supplied to specification or degradation during transport and storage	• Traceable to a precursor which has degraded between manufacture and use	Contractor Management System – Audits of supplier to ensure compliance with QA/QC systems.
Initiation explosives not manufactured to specification or degradation during transport and storage	• Damaged packing or out-of-date stock • Misfire	MTW-10-WI-MINE-244-002 Conduct Magazine Operations requires • At time of stock-take or delivery, check manufacturing date of stock and condition of boxes • If there are multiple boxes of the same item open, the Magazine Keeper should (where possible) consolidate items into a single box to minimise the number of opened boxes, without exceeding the maximum quantity allowed for each box • Rotate stock in a systematic manner that ensures that older stock gets used first
Raw material changes	• All areas associated with loading from a specific delivery system • Product appearance changed	Change management procedures in place by suppliers Prior notification to suppliers from site change management systems where other raw materials are supplied by the customer, for example diesel fuels
Product Degradation	• Slumping of holes	Sleep time of 4 days maximum for all shots. Sleeping a shot more than 4 days requires the approval by the Drill and Blast Superintendent. Any sleeping shot is inspected daily by the shot firer when in attendance.

Primary Cause 6: Contamination of explosives in the blast hole		
Potential Cause	Likely indicators	Control measures
Explosive product mixes with mud/sediment at bottom of hole.	• Blasts containing wet/dewatered blast holes only • Dipped depth inconsistent with drilled depth indicating hole collapse	Optimise drilling practices to minimise blast hole damage
		Ensure appropriate loading practices are followed during charging
		Ensure primer is positioned in undamaged explosive product
		Where mud or sediment is identified in a hole from dipping, a gas bag will be used to separate mud/sediment from explosive product.
		Use blast hole savers
Penetration of stemming material into top of explosive column (fluid/pumpable explosive products only)	• Blasts charged with fluid/pumpable explosive products only	Use appropriate stemming material
		Ensure explosive product is gassed to manufacturers specifications before stemming
Water entrainment in explosive product	• Blasts containing wet/dewatered blast holes only • Dynamic water present • Historical groundwater information	Adjust explosive product selection according to manufacturer's recommendations depending on changing conditions.
		Ensure appropriate loading practices are followed during charging
		Eliminate top loading into wet blast holes that cannot be dewatered
		Ensure all primers are positioned in undamaged explosive product
		Use of gas bags in dewatered or contaminated blast holes
		Protect top of explosives column to prevent water ingress

		Reduce excessive hose lubrication during charging Adjust explosive product selection according to manufacturer's recommendations for wet environment.
		Verify correct hose handling practices are in place
		Load low blast holes last where practical
		Minimize sleep time where practical

Primary Cause 7: On bench practices		
Potential Cause	Likely indicators	Control measures
Hole condition incorrectly identified	• Slumping of holes • Unexpected material in drill cuttings	Assess all holes prior to loading in particular presence and extent of any water
		Use number and location of wet holes as a basis for explosive product selection and determining loading sequence
		Minimise time between drilling and loading, especially in soft and clay strata. Note: Enough time should be allowed for any dynamic water in the hole to be identified
		Assess holes for slumping on any sleeping shots
		Minimise sleep time
Blast not drilled as per plan	• Can be correlated with incorrectly drilled patterns	Drillers to report holes not complying with plan. Verify drill hole accuracy in areas considered critical using drill hole positioning and recording system. Adjust design as necessary.
Dewatering of holes diverts water into holes previously loaded with dry hole explosive products	• Visual inspections of water on bench. • Bench setup, understanding gradient of bench for water runoff	Load wet holes in a sequence that ensures other holes are not impacted. Adjust explosive product selection according to manufacturer's recommendations.

6. Management of fume

Due to the close proximity of the Putty Road, Charlton Road, Wallaby Scrub Road and Mount Thorley Industrial Estate to Mount Thorley Warkworth lease boundaries, blasting restrictions detailed in MTW-13-ENVMPR-SITE-E6-013 MTW Blast and Vibration Monitoring Programme such as wind speeds and directions, are strictly observed. Any shot expected to produce fume that is in close proximity to the aforementioned public areas require a road closure as per MTW-Road Closure Management Plan

Within site boundaries, the blasting exclusion zone and sentry procedure takes into account the location of mine personnel on the lease at the time of detonation. A minimum 500 m exclusion zone is the standard for MTW however may be extended to any distance at the shotfirer's discretion. This includes reducing the risk of exposure to personnel downwind of a blast with the potential for fume.

The health and safety risks of blast fumes and information for treating medical staff is outlined in Appendix 3 & 4

In the event that a post-load risk rating indicates the likelihood of fume the following protocol is to apply

Report / Record	Responsibility	Content
Identify factors contributing to potential fume	Drill and Blast Engineer	▪ Horizon history ▪ Clay / weak material ▪ Rain during loading ▪ Holes slumping ▪ Product selection issues ▪ Product delivery issues ▪ Excessive sleep time ▪ Dynamic water
Defining Fume Management Zone	Competent group consisting of Superintendent, Supervisor, Engineer and Shotfirer – all persons inside the FMZ to be evacuated and area sentried prior to blast	Extent of zone based on • Likely fume level at blast to be assessed by group based on above factors • Wind speed and direction • Inversions • Cloud cover • Time of day • Atmospheric stability • Temperature • Humidity • Dispersion model (Fume dispersion site-law under development)
Fume management zone notifications	D&B Engineer Supervisor	A hardcopy plan with FMZ clearly marked on current aerial photo along with any sensitive sites (Roads, Bulga Coal, Industrial Area) Internal notifications ▪ Daily blast schedule email, Daily

	D&B Engineer / Supervisor Environmental Officer	planning meeting ▪ Time permitting – TBT fume ▪ protocols - windows up, a/c on recirculation ▪ ESO to be on standby for high potential events Bulga Coal where appropriate Road closure notifications - As per Road Closure Management Plan External Stakeholders such as DoP, EPA, Community, etc.
Firing Blast – as per MTW-10-WI-MINE-244-011- FIRING A SHOT & MTW-10-WI-MINE-244-009 Closing Public Roads	Traffic Road runner All Shotfirer D&B Engineer	Fume level measurements as part of road inspection Fume protocol for vehicle occupants – verbal or document - Windows up and a/c on recirculation Fume observation - Warning message to potentially impacted parties if required – • Windows up and a/c on recirculation To utilize fume monitor when conducting post blast inspection Video blast Fume level measurements (monitoring)
Fume Emergency	All	Shot firer, supervisor or sentry or any witness to raise emergency based on observations. ESO and OCE to coordinate response. Advice for anyone potentially affected by fume • Get out of the cloud. • Seek fresh air. • Use water to reduce the amount of exposure to wash out eyes and clear nose and throat See Appendix 3 & 4 for health and safety

		risks of fume and advice for treating medical staff
Reporting	Shotfirer D&B Engineer Supervisor	MTW-10-REG-MINE-245-001 Shotfiring Shift Report. Assess FMZ against forecast Update fume dispersion site law based on new measurements Notify Explosives Supplier of fume event to aid in investigation and communication The following fume events shall be raised as incidents: • a blast rated 3 when leaving site or 4 or 5 on the blast fume rating scale; • the visible fume cloud travels beyond the blast exclusion zone; • when any person has been directly exposed to fumes Note that a road closed for the purpose of blasting is considered part of the site The following factors should be considered for inclusion in any post-blast incident report: • date and time of blast; • explosives type, quantity, initiation type; • ground geology (soft, faults, wet); • post-blast NOx gas rating, eg 0 – 5 & A-C; • duration of any post-blast NOx gas event (measure of time to disperse); • direction of movement of any post-blast NOx plume; • movement of any post-blast NOx gas plume relative to the established exclusion zone and any established management zone (ie maintained within, exceeded); • climate conditions, including temperature, humidity, wind speed and direction, cloud cover, rain; • results/readings of any NOx monitoring equipment employed for the blast • video results of blast where relevant.

	Environmental Coordinator Superintendent Mining Manager	Notify the Department of Planning and Infrastructure of any blast producing post blast fume that rates 3 when leaving the site, and any blast that rates 4 or 5. Where the fume leaves the site and has the potential to cause material harm (to the public/environment), immediately notify the following as per the Pollution Incident Response Plan: • EPA Environmental Line (131 555) • DoPI (02 6575 3402) • Ministry of Health (Newcastle Public Health Unit (02 4924 6477) • Workcover (13 10 50) • Singleton Council (02 6578 7290, a/h 02 6572 1400) Fire and Rescue NSW (000) Escalate fume events to Mining Manager & Hunter Valley Environmental Services. Reporting of fume events to Mines Inspectorate as appropriate.

7. Documentation and records

The documentation and records used for the preparation and firing of a blast are retained in the Drill and Blast Office. The records contain:

Report / Record	Responsibility	Content

Blast design and performance record	Drill and Blast Engineer	• Blast Design
		• Drill Pattern Plans
		• Preload risk rating
		• Load Sheet
		• Blasting Schedule
		  ○ Location of Blast
		  ○ Type of Blast
		• Pre-fire risk rating
		• Video of blast
		  ○ Operator is to ensure that filming continues post detonation, to ensure any potential fume or dust clouds are captured.
		• Environmental records
		  • Air Blast
		  • Vibration
		  • Fume rating
		  • Measured fume concentration and weather details
		  • Video frame jpegs representative of plume dispersion
		• Monthly reconciliation of blasted volumes

Explosives stock control	Shotfirer	• Quantity (weight/numbers of units) of explosives delivered • Quantity (weight/numbers of units) of explosives used on a shot basis

Shotfiring Report	Shotfirer in charge	• Date/time of firing • Name, type and location of shot • Explosives type, tonnages delivered of explosives used • Number of holes charged (for day/total) • Pattern Size • Hole Diameter • Average Hole Depth • Numbers of holes fired • General comment on blast loading progress or results. • Environmental comments • Fume Category
Drill Shift Report	Drill Operator	• Drill Number • Location/Pattern No. • Burden & Spacing • Operator Name • Bit Size • Date/Time/Shift • Drilling task by the Hour • Hole Number • Hole Depth • Comments – including where holes are drilled off the designed location by more than 0.5m • Total Summary for shift

8. Glossary

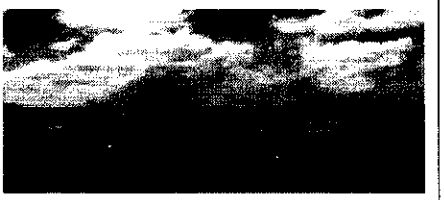
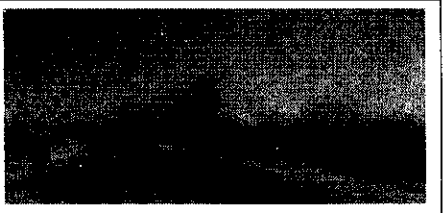
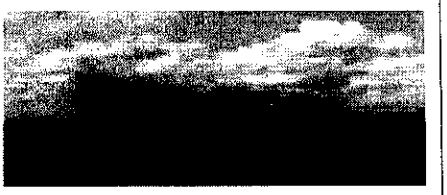
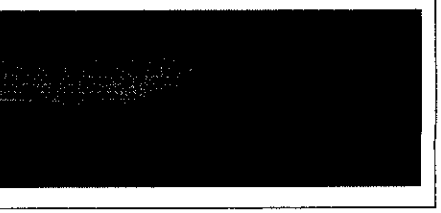
Wet Hole – A wet hole is defined as any drill hole containing more than 1 metre of water at the bottom of the hole and/or having wet sides anywhere down the hole. Any hole that has been dewatered is classified as a wet hole.

Dry Hole – A dry hole is defined as any drill hole having less than 1 metre of static water at the bottom of the hole. Should water be detected through the dipping process, a gas bag is used to close off the bottom of the hole, prior to the loading of any explosive product.

APPENDIX 1 – GENERALISED FLOWCHART FOR FUME EVENT

APPENDIX 2 - VISUAL NOx GASES RATING SCALE

The following table, together with the Field Colour Chart on the next page, details how NOx gases from a surface blast can be assessed [Ref 6, AESIG].

Level	Typical Appearance
Level 0 No fume	
Level 1 Fume	
Level 2 Minor yellow/orange fume	
Level 3 Moderate orange fume	
Level 4 Significant orange fume	
Level 5 Major red/purple fume	

Field Colour Chart.

Assessing the amount of NOx produced from a blast will depend on the distance the observer is from the blast and the prevailing weather conditions. The Field Colour Chart can be used to assess the level of NOx that is produced in a surface blast.

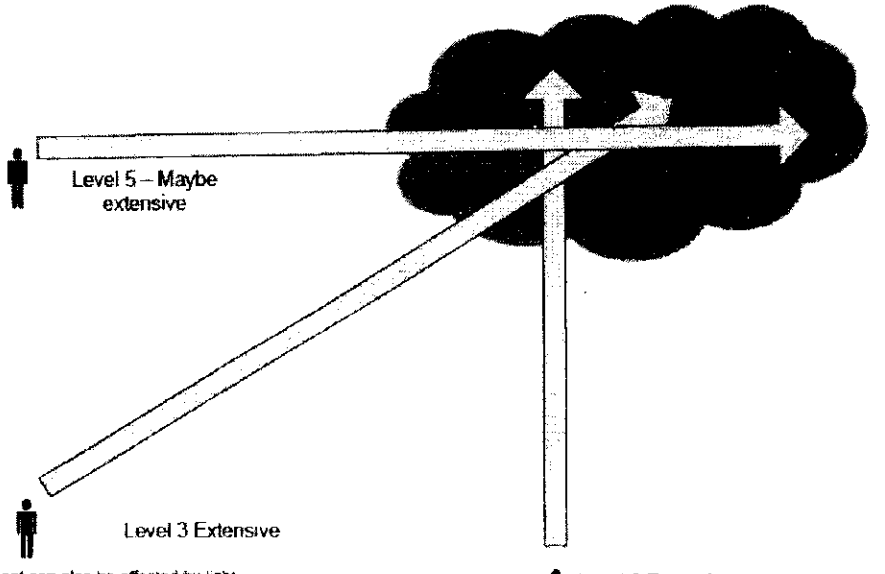
Pantone colour numbers have been included in the Field Colour Chart to ensure colours will always be produced correctly thereby ensuring a reasonable level of standardisation in reporting fume events across the mining industry.

Level	Colour	Pantone Number
Level 0 No Fume		Warm Grey 1C (RGB 244, 222, 217)
Level 1 Fume		Pantone 155C (RGB 244, 219, 170)
Level 2 Minor yellow/orange fume		Pantone 157C (RGB 237, 160, 79)
Level 3 Moderate orange fume		Pantone 158C (RGB 232, 117, 17)
Level 4 Significant orange fume		Pantone 1525C (RGB 181, 84, 0)
Level 5 Major red/purple fume		Pantone 161C (RGB 99, 58, 17)

Observation Issues

The angle of the person to the fume event will influence the assessment. Where possible and without placing persons in the path of a fume cloud there should be a number of observers to record the level. This can be moderated to give a more accurate indication of the cloud.

The issue is that the observer position and fume cloud orientation may influence the rating given.



- Assessment can also be affected by light conditions as this will vary appearance of fume cloud
- Significant temperature variations can also affect fume cloud colour

EFFECT OF ANGLE TO FUME CLOUD AFFECTING ASSESSMENT

APPENDIX 3 – HEALTH AND SAFETY RISKS OF BLAST FUMES

NIOSH Pocket Guides

The US National Institute for Occupational Safety and Health (NIOSH) produces the *NIOSH Pocket Guide to Chemical Hazards* (NPG)... "intended as a source of general industrial hygiene information on several hundred chemicals/classes for workers, employers, and occupational health professionals. The NPG does not contain an analysis of all pertinent data, rather it presents key information and data in abbreviated or tabular form for chemicals or substance groupings (e.g. cyanides, fluorides, manganese compounds) that are found in the work environment. The information found in the NPG should help users recognize and control occupational chemical hazards."

The NIOSH Pocket Guides for NO, NO_2 and CO are reproduced with authority of the US Centers for Disease Control and Prevention, 1600 Clifton Rd, Atlanta, GA 30333, USA.

The guides can be accessed through the NIOSH Pocket Guide to Chemical Hazards homepage: http://www.cdc.gov/niosh/npg/default.html

Note that the exposure limits do not necessarily match the Australian STEL and TWA.

Health and Safety Risks of Blast Fumes

Nitrogen Dioxide (NO_2)

NO_2 is a toxic gas that irritates the eyes and mucous membranes, primarily by dissolving on contact with moisture and forming a mixture of nitric and nitrous acids.

Inhalation can result in respiratory tract irritation and pulmonary oedema. Onset of pulmonary oedema can be delayed and can cause death, so personnel who have been exposed to NO_2 must be observed in hospital for at least 12 hours. Changes in pulmonary function are evident at exposures levels of 2 to 3 ppm NO_2 [Ref 9]; asthmatics are particularly sensitive, potentially suffering significant bronco-spasm at very low concentrations.

NO_2 varies in colour from light orange through to reddish-brown, depending on the concentration and the light conditions. NO_2 is visible in concentrations above 2.5 ppm [Ref 5], although from a distance (such as viewing a blast) the concentrations may need to be above 30 ppm to be observed [Ref 2].

NO_2 has a sharp, biting odour and can be detected by smell at low concentrations (< 0.5 ppm), but the sense of smell can be subdued above 4 ppm. It has a higher molar mass (46) than air (28.8) and consequently tends to travel across the ground, dispersing over distance.

The STEL for NO_2 is 5 ppm (9.4 mg/m^3), TWA is 3 ppm (5.6 mg/m^3), and 20 ppm is considered IDLH (immediately dangerous to life or health).

The US National Institute for Occupational Safety and Health (NIOSH) recommended short term exposure limit is 1 ppm

Concentration	Symptoms
~ 800 ppm	15 seconds exposure lethal by reflex choking if not rescued. Extremely irritating to the eyes, nose and throat.
~ 350 ppm	5 minutes exposure lethal by reflex choking if not rescued. Extremely irritating to the eyes, nose and throat
~ 250 ppm	Lethal to man 15 minutes by reflex choking. Airway reactivity and resistance makes breathing more difficult with time. Less than 5 minutes exposure causes potentially fatal pulmonary oedema
~ 200 ppm	Lethal to man in 30 minutes by reflex choking. Airway reactivity and resistance makes breathing difficult.
150 ppm	For 10 minutes or less causes coughing; eye, nose and throat irritation; headache; nausea and vomiting. Longer exposure can cause permanent eye damage and potentially fatal delayed pulmonary oedema
90 ppm	For 40 minutes has caused moderate irritation to the eyes and mucous membranes and potentially fatal delayed pulmonary oedema. The delay may be up to 70 hours when symptoms of cyanosis (turning blue), shortness of breath, restlessness, headache and frothy yellow or brown sputum appear. If untreated, fluids or froth can flood the lungs (i.e. drowning) or can be infected by viruses or bacteria resulting in bronchitis or pneumonia which may be fatal to a weakened patient.
50 ppm	Moderately irritating to the eyes and mucous membranes within 10 minutes and long exposure can cause permanent eye damage.
4-5 ppm:	For 15 minutes will cause increased airway reactivity (constriction of airways), airway resistance (more effort needed to breathe), and decreased diffusion of gases in the lungs
4 ppm	For 10 minutes anaesthetises the nose so it can no longer smell
0.1 ppm	For 2 hours can result in increased airway reactivity for asthmatics or people with chronic bronchitis.

Symptoms of nitrogen dioxide exposure [Ref 1]

Nitric Oxide (NO)

NO is a colourless gas, with a slightly irritating odour. It is slightly soluble in water and forms nitrous and nitric acid. Mild exposure can cause shortness of breath, coughing and chest pains, but more severe exposure (above 100 ppm) can lead to pulmonary oedema, cyanosis, or respiratory failure [Ref 8].

The TWA is 25 ppm (31 mg/m^3), and 100 ppm is IDLH (immediately dangerous to life or health).

Concentration	Symptoms
~ 8,000 ppm (0.8%)	Sudden unconsciousness followed by death in 1 minute by chemical asphyxiation. Higher concentrations may be fatal in less time
~ 3,000 ppm (0.3%)	Dizziness or drowsiness in minutes quickly followed by unconsciousness and death in 5 Minutes
~ 1,600 ppm	Muscular tremors, loss of coordination, faster breathing, faster heart rate, drowsiness, dizziness, excess salivation and vomiting may occur in 5 minutes with unconsciousness in 10 minutes and death in 15 minutes
~ 400 ppm	First symptoms, similar to 1,600 ppm above, appear within 2 hours when Methemoglobin concentration reaches 30-40%. Vomiting may cease and unconsciousness may occur within 3 hours. Still has the potential to be fatal if Methemoglobin concentration of blood reaches 70- 90%
0.3 – 0.9 ppm	Pungent odour

Symptoms of nitric oxide exposure [Ref 1]

Carbon Monoxide (CO)

CO is a colourless, odourless and tasteless gas. It is readily absorbed through the lungs, where it displaces oxygen in blood through the formation of CO-haemoglobin, leading to headache, fatigue, dizziness, drowsiness and nausea. Large amounts of CO can lead to rapid loss of consciousness and death.

Atmospheric CO (ppm)	CO-Hb in Blood (%)	Symptoms
1950	80	Rapidly fatal.
800-1220	60-70	Unconsciousness; intermittent convulsions; respiratory failure; death if exposure is prolonged.
350-520	40-50	Headache; confusion; collapse; fainting upon exertion.
220	30	Decided headache; irritability; easy fatigability; disturbed judgment; possible dizziness; dimness of vision.
120	20	Shortness of breath with moderate exertion; occasional headache with throbbing in the temples.
70	10	Shortness of breath upon vigorous exertion; possible tightness across the forehead.

Symptoms of carbon monoxide exposure. The table gives the levels of COHb in the blood which tend to form at equilibrium with various concentrations of CO in the air and the clinical effects observed [Ref 10].

The TWA is 30 ppm (34 mg/m^3). Short-term excursions should never exceed 400 ppm [Ref 12].

Sulphur Dioxide (SO_2)

SO_2 is a colourless gas with a characteristic pungent and irritating odour. It is a severe irritant of the eyes, mucous membranes and skin, due to the rapid formation of sulphurous acid on contact with moist membranes. High concentrations can cause respiratory paralysis or pulmonary oedema.

Concentration	Symptoms
80 – 100 ppm	May cause an increased incidence of nasopharyngitis, shortness of breath on exertion (dyspnea), and chronic fatigue
10 – 50 ppm	For 5 to 15 minutes: irritation of the eyes, nose and throat; rhinorrhea (discharge of thin nasal mucus), choking, cough, and in some instances reflex broncoconstriction with increase pulmonary resistance.
10 ppm	Upper respiratory irritation; nose bleeds
5 ppm	Coughing after 5 minutes
3 ppm	Odour threshold
0.3 – 1 ppm	Detectable by taste

Symptoms of sulphur dioxide exposure [Ref 15]

The STEL for SO_2 is 5 ppm (13 mg/m^3), TWA is 2 ppm (5.2 mg/m^3), and 100 ppm is considered IDLH (immediately dangerous to life or health) [Ref 15].

Hydrogen Sulphide (H_2S)

H_2S is a colourless gas with a strong 'rotten egg' odour. It is irritating to the eyes and the respiratory tract, and may cause effects on the central nervous system. Inhalation may lead to

pulmonary oedema, and as with NO_2, the effects may be delayed by several hours.

Concentration	Symptoms
400 – 700 ppm	Loss of consciousness and possible death after 30 – 60 minutes
50 – 200 ppm	Severe respiratory tract irritation; eye irritation
100 ppm	Loss of sense of smell due to olfactory fatigue
20 ppm	Neurological effects including memory loss and dizziness
5 – 10 ppm	Minor metabolic effects
2 ppm	Bronchial restriction in some asthmatics
0.008 ppm	Odour threshold

Symptoms of hydrogen sulphide exposure [Ref 16, 17]

The STEL for H_2S is 15 ppm (21 mg/m^3), TWA is 10 ppm (14 mg/m^3), and 100 ppm is considered IDLH (immediately dangerous to life or health).

APPENDIX 4 - INFORMATION FOR TREATING MEDICAL STAFF

Those exposed to NOx gases should seek immediate medical treatment and consideration should be given to placing those exposed under observation for at least 24 hours after exposure.

To assist medical staff the following guide should be provided.

Advice to Medical Staff in the Treatment of Those Who Have Been Exposed to NOx Gases.

The patient may have been exposed to NOx. This is a gas usually produced on mines after the use of explosives. NOx consists of multiple combinations of nitrogen and oxygen (N2O, NO, NO2, N2O4, N2O3, N2O5). Nitrogen dioxide (NO2) is the principle hazardous nitrous gas. NOx irritates the eyes and mucous membranes primarily by dissolving on contact with moisture and forming a mixture of nitric and nitrous acids. But this is not the only mechanism by which injury may occur. Inhalation results in both respiratory tract irritation and pulmonary oedema. High level exposure can cause methhaemoglobinaemia. Some people, particularly asthmatics, can experience significant broncospasm at very low concentrations.

The following effects are commonly encountered after NOx exposure:

ACUTE

- Cough
- Shortness of breath
- Irritations of the mucous membranes of the eyes, nose and throat

SHORT TERM

- Pulmonary oedema which may be delayed for up to 4-12 hours

MEDIUM TERM

- R.A.D.S. (Reactive Airways Dysfunction Syndrome
- In rare cases bronchiolitis obliterans which may take from 2-6 weeks to appear

LONG TERM

- Chronic respiratory insufficiency

High level exposure particularly associated with methhaemoglobinaemia can cause chest pain, cyanosis, and shortness of breath, tachapnea, and tachycardia. Deaths have been reported after exposure and are usually delayed. Even non irritant concentrations of NOx may cause pulmonary oedema. Symptoms of pulmonary oedema often don't become manifest until a few hours after exposure and are aggravated by physical effort. Prior to transfer to you the patient should have been advised to rest and if any respiratory symptoms were present should have been administered oxygen. The patient will need to be treated symptomatically but as a base line it is suggested that the following investigations are required:

- Spirometry
- Chest x-ray
- Methheamoglobin estimation

Because of the risk of delayed onset pulmonary edema it is recommended that as a precaution the patient be observed for up to 12 hours. As no specific antidote for NOx exists, symptoms will have to be treated on their merits.

References

AEISG, 2011, *Code of Practice – Prevention and Management of Blast Generated NO_x Gases in Surface Blasting*, Edition 1, AESIG Inc.

Environmental Procedure ATT09-02-11

Environmental Procedure EP9.2

MTW-13-ENVMPR-SITE-E6-013 MTW Blast and Vibration Monitoring Programme

MTW-02-LC-SITE-E10-026 MTW Temporary Closure of Roads for Blasting

MTW-10-MHMP-241 Explosives Major Hazard Management Plan

MTW-10-WI-MINE-244-001 Approving and Trialling Explosives and Equipment Work Instruction

MTW-10-WI-MINE-244-009 Closing Public Roads Work Instruction

MTW-10-WI-MINE-244-002 Conduct Magazine Operations Work Instruction

MTW-10-WI-MINE-244-013 Dealing with a Misfire Work Instruction

MTW-10-WI-MINE-244-016 Dealing with Elevated Temperatures and Reactive Ground Work Instruction

MTW-10-WI-MINE-244-015 Dealing with Obsolete Explosives Work Instruction

MTW-10-WI-MINE-244-004 Demarcating and Accessing a Loaded Shot Work Instruction

MTW-10-WI-MINE-243-002 Drilling a Shot Work Instruction

MTW-10-WI-MINE-244-011 Firing a Shot Work Instruction

MTW-10-WI-MINE-244-006 Loading Blast Holes Work Instruction

MTW-10-WI-MINE-244-010 Postponing Firing of a Tied In Shot Work Instruction

MTW-10-WI-MINE-244-005 Priming Blast Holes and Distributing IE Work Instruction

MTW-10-WI-MINE-243-003 Redrilling a Shot Work Instruction

MTW-10-WI-MINE-244-007 Stemming Blast Holes Work Instruction

MTW-10-WI-MINE-244-008 Tying in a Shot Work Instruction

Coal Australia, Mine Operations Improvement - Blast Fume Management Guidelines

Orica Mining Services, 2010, *Orica Product Selection Guide October 2010*, Orica Australia Pty Ltd.

Queensland Government, 2011, *Queensland Guidance Note QGN 20 v2 Management of oxides of nitrogen in open cut blasting*. Department of Employment, Economic Development and Innovation, Queensland.

Safe Work Australia, Exposure Standard for Carbon Monoxide, http://hsis.ascc.gov.au/DocumentationES.aspx?ID=111

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US National Institute for Occupational Safety and Health (NIOSH), *Documentation for Immediately Dangerous to Life or Health Concentrations (IDLHs)*, http://www.cdc.gov/niosh/idlh/idlhintr.html

US National Institute for Occupational Safety and Health (NIOSH) and US Occupational Safety and Health Administration, *Occupational Safety and Health Guideline for Sulfur Dioxide*, 1978, http://www.cdc.gov/niosh/docs/81-123/pdfs/0575.pdf

US Occupational Safety & Health Administration, *Nitric Oxide in Workplace Atmospheres* (ID190), http://www.osha.gov/dts/sltc/methods/inorganic/id190/id190.html US Occupational Safety & Health

Administration, *Nitric Dioxide in Workplace Atmospheres* (ID182), http://www.osha.gov/dts/sltc/methods/inorganic/id182/id182.html

US Occupational Safety & Health Administration, *Carbon Monoxide in Workplace Atmospheres*, http://www.osha.gov/dts/sltc/methods/inorganic/id209/id209.html

National Occupational Health and Safety Commission, *Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment*, (NOHSC:1003), Australian Government Publishing Service, Canberra, 1995.

Document Control

Approvals

Name	Role	Signature	Date

Revision History

This protocol is to be reviewed at least every three years or as otherwise directed by the Director-General of DoPI (Department of Planning and Infrastructure). The review process is to reflect changes in environmental legislation and guidelines, and changes in technology or operational procedures.

Date	Version	Author	Notes

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Appendix F - Example of Typical Blasting Permissions Page

Blasting Permissions for **MTW Moorlands Loders**

Blasting Permissions

Last one minute average as at: 10/10/12 12:50

Wind Speed: 4.2 m/sec
Wind Direction: 331 °
Rolling 10 min average: 4.05 m/sec at 298 °

OK To Blast at MTW Moorlands Loders

Reason: Meets all blast permission criteria

10 Minute Averages

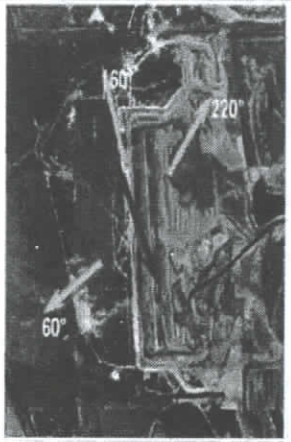
Date/Time	Wind Speed	Wind Dir	Temp
10/10/12 12:50	1.8 m/s	336.6°	23.4°C
10/10/12 12:40	3.6 m/s	347.4°	23.9°C
10/10/12 12:30	2.4 m/s	1.1°	22.3°C
10/10/12 12:20	2.1 m/s	43.0°	22.2°C
10/10/12 12:10	1.6 m/s	16.4°	21.3°C
10/10/12 12:00	2.2 m/s	0.0°	21.7°C
10/10/12 11:50	2.5 m/s	0.0°	20.7°C
10/10/12 11:40	1.7 m/s	0.0°	20.4°C
10/10/12 11:30	2.5 m/s	359.9°	20.1°C
10/10/12 11:20	2.7 m/s	0.0°	20.3°C
10/10/12 11:10	2.2 m/s	341.5°	19.3°C
10/10/12 11:00	2.6 m/s	351.9°	18.6°C

Return To Environmental Monitoring Menu
Return To Home Page

1 Minute Averages

Last 20 minutes

1 Minute Direction



Blast Permissions Rules

Do not blast if one minute direction between 60 and 160 degrees and one minute windspeed below 1 m/sec
Do not blast if ten minute direction between 60 and 160 degrees and ten minute windspeed below 1 m/sec
Do not blast if one minute direction between 60 and 220 degrees and one minute windspeed between 6.5 and 10 m/sec
Do not blast if ten minute direction between 60 and 220 degrees and ten minute windspeed between 6.5 and 10 m/sec
Do not blast if time between 17:00 and 07:00
Do not blast if windspeed above 10 m/sec
otherwise ok to blast

Exhibit 16

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 30 2013

OFFICE OF
THE ADMINISTRATOR

Mr. Edward B. Zukoski
Staff Attorney
Earthjustice
1400 Glenarm Place, Suite 300
Denver, Colorado 80202-5050

Dear Mr. Zukoski:

On June 16, 2010, Earthjustice, acting on behalf of WildEarth Guardians, Center for Biological Diversity, the Environmental Integrity Project and the Sierra Club, who collectively are the petitioners, sent a letter to the U.S. Environmental Protection Agency petitioning the agency to make a finding that air emissions from coal mines may reasonably be anticipated to endanger public health and welfare, thus warranting listing coal mines as a new stationary-source category pursuant to Clean Air Act section 111(b)(1)(A), and to conduct any required associated rulemakings.

I am informing you that the EPA is denying this petition to add coal mines to the Clean Air Act section 111 list of categories and declining to initiate the requested rulemakings at this time. This denial fully and finally responds to your petition and is the EPA's final agency action on your petition. As discussed below, the agency must prioritize its regulatory actions. This is especially the case in light of limited resources and ongoing budget uncertainties. For these reasons, the EPA at this time cannot commit to conducting the process to determine whether coal mines should be added to the list of categories under Clean Air Act 111(b)(1)(A) and thus is denying your petition. This denial is not based on a determination as to whether the emissions from coal mines cause or significantly contribute to air pollution that may reasonably be anticipated to endanger public health and welfare. In the future, the EPA may initiate the process for such a determination, but the agency has decided that it will not do so now.[1]

I. Introduction

A. Statutory Provisions

Clean Air Act section 111(b)(1)(A) provides that the EPA "shall publish (and from time to time thereafter shall revise) a list of categories of stationary sources [and shall include a category on the list]

[1] The June 2010 petition also asked the EPA, after listing coal mines under Clean Air Act section 111, to establish federal standards of performance for new and modified sources in the coal-mines category and establish federal standards of performance to address methane emissions from existing sources within the coal-mines category. Because the EPA is denying the request to list coal mines at this time and because the duty to set standards under Clean Air Act section 111 for a given category is based on the listing of that category under section 111(b)(1)(A), the request that the EPA set standards for new, modified and existing sources within the coal-mines category is moot.

if in [the Administrator's] judgment it causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare." For categories that the EPA lists under section 111(b)(1)(A), section 111(b)(1)(B) provides that the EPA must propose federal standards of performance for new sources within the newly established category within one year of listing and then, after an opportunity for public comment, finalize the standards within one year of publishing the proposed standards.

B. Procedural History

On June 16, 2010, the petitioners sent a letter to the EPA petitioning the agency to:

> (1) make a finding that air emissions from coal mines may reasonably be anticipated to endanger public health and welfare, thus warranting listing coal mines as a new stationary-source category pursuant to Clean Air Act section 111(b)(1)(A);
> (2) establish federal standards of performance for air emissions from new and modified coal mines pursuant to Clean Air Act section 111(b)(1)(B);
> (3) issue federal standards of performance for methane emissions from existing coal mines pursuant to Clean Air Act section 111(d)(1).

Petition, at 2-3.

On April 8, 2011, the petitioners notified the EPA of their intent to file suit against the EPA for failure to respond to the June 2010 petition, as required by Clean Air Act section 304(a). On November 17, 2011, the petitioners filed a complaint with the United States District Court for the District of Columbia, alleging that the EPA had unreasonably delayed taking final action on the petition for rulemaking and requesting that the court compel action under the Clean Air Act and the Administrative Procedure Act. The EPA and the petitioners subsequently agreed to stay the litigation to allow the EPA time to determine whether it could commit to act on the petition within a specific time frame, in light of the agency's limited resources, ongoing budget uncertainties and existing obligations to meet statutory and consent decree deadlines.

II. Summary of Petition

In their petition, the petitioners cite the definition of "air pollutants" in Clean Air Act section 302(g), assert that air emissions from coal mines – including surface, underground and abandoned mines – are such pollutants and hence request that the EPA regulate air emissions from coal mines under section 111 of the Clean Air Act. The petitioners' primary stated goal is the reduction of methane, but they also want reductions of emissions of particulate matter, nitrogen oxides and volatile organic compounds. The petitioners assert that pursuant to Clean Air Act section 111(b)(1)(A), the EPA is required to list coal mines as a new category of stationary sources that emit air pollution when such emissions may reasonably be anticipated to endanger public health or welfare. Additionally, the petitioners assert that the EPA must establish federal standards of performance for new and modified sources within the newly listed stationary-source category for coal mines and establish federal standards of performance to address methane emissions from existing sources within the newly listed stationary-source category for coal mines.

The petitioners argue that pursuant to the requirements of Clean Air Act section 111, air emissions from coal mines must be regulated because they cause or significantly contribute to the endangerment of the

public health and welfare. The petitioners cite examples and references regarding the effects of greenhouse gases on climate change and the consequences on public health and welfare. The petitioners state that methane is the second-most emitted greenhouse gas and that its heat trapping capability is more than 20 times more potent than carbon dioxide. They further state that because methane has a significantly shorter atmospheric lifespan compared to the lifespan of carbon dioxide, reducing methane emissions may mitigate climate change to a greater degree in the short term. Additionally, the petitioners state that methane is a safety hazard and known public-health risk that can create an explosive hazard to coal miners and contributes to the formation of ground-level ozone pollution.

The petitioners identify several technological emission-control measures that they claim could reduce methane emissions from coal mines. They state that they also seek "to spur the development of cost-effective controls to reduce harmful air emissions from coal mining … to both spur economic development and confront the effects of global warming."

III. Response to Requests

The petitioners request that the EPA make a finding that air emissions from coal mines cause or significantly contribute to air pollution that may reasonably be anticipated to endanger public health or welfare and list coal mines as a stationary-source category under Clean Air Act section 111. While the EPA has sought to be responsive and to consider the petitioners' request, resource limitations and the necessity of completing court-ordered rulemaking actions have continued to hinder that effort. Between fiscal years 2006 and 2013, the budget for the EPA's Office of Air Quality Planning and Standards –the office that would conduct a Clean Air Act 111(b)(1)(A) review for coal mines – was reduced by 12 percent in real dollars and staff levels have also slightly decreased. Moreover, the portion of the budget available to provide additional technical support through contracting has been reduced by 43 percent in real dollars as a result of these budgetary reductions and increases in other costs. More recently, the reduced appropriations in the continuing resolution funding the EPA for the remainder of fiscal year 2013, in conjunction with the automatic reductions in federal agency resources known as the sequestration, have impacted the EPA's ability to respond. Specifically, the reductions mandated by the sequestration have further reduced the EPA's 2013 budget and have necessitated significant reductions in a number of regulatory efforts already under way. As part of the sequestration, the EPA is facing agencywide furloughs of almost 10 days per employee between April 21 and September 30, which further reduces available staff time.

Even under the best circumstances, the EPA cannot undertake simultaneously all actions related to clearly determined priorities as well as those requested by the public, and so the agency must afford precedence to certain actions while deferring others. The current budgetary situation serves only to increase the need for setting priorities. The EPA already is required to conduct numerous actions that have mandatory deadlines, including a number of actions resolving mandatory duty claims made by WildEarth Guardians and the other petitioners, and has little or no discretion to lower the priority of those actions. For example, the Office of Air Quality Planning and Standards faces an agenda of more than 45 nationally applicable stationary-source rules due for review or promulgation by September 2014. Of these 45 rules, more than 25 are subject to consent decrees with current deadlines that must be met between now and the end of fiscal year 2014, leaving the EPA no discretion to prioritize. In addition, more than 15 additional, recently issued rules are either being challenged in court or stakeholders have petitioned us to reconsider these rules. Both defending the litigation and evaluating petitions for reconsideration require significant commitment of the agency's staff, time and resources. Thus, the

agency is being asked to accomplish many actions with less budget and staff available. The EPA must prioritize its undertakings to efficiently use its remaining resources.

The EPA is taking a common-sense, step-by-step approach intended to obtain the most significant greenhouse-gas-emissions reductions through using the most cost-effective measures first. The sectors and source categories that the EPA is currently addressing under the Clean Air Act and through voluntary climate programs represent more than 60 percent of the total 2011 U.S. emissions of greenhouse gases.[2] The EPA believes that a step-by-step approach, starting with these largest sources and sectors, such as transportation and electricity systems, is the most appropriate course to reduce greenhouse-gas emissions, and the agency has undertaken a number of significant rulemakings intended to do so. To achieve reductions in greenhouse-gas emissions from the transportation sector, which represented 27 percent of 2011 U.S. greenhouse-gas emissions, the EPA has proposed and finalized standards for greenhouse-gas emissions both from heavy-duty trucks and twice from cars and light-duty trucks.[3,4,5,6,7,8]

As for stationary sources, approximately 45 categories of them emit greenhouse gases. The agency is currently addressing standards for greenhouse-gas emissions from new units in the electricity-generating category after having issued a proposal in April 2012.[9] Pursuant to a consent decree negotiated with your clients, the EPA also recently completed a rulemaking in which it significantly increased the regulation of emissions from the oil and natural-gas sector. While the agency did not directly regulate greenhouse gases in that rule, greenhouse-gas co-benefits from that rule are estimated at 19 million metric tons CO_2e.[10] As we indicated in the final oil and gas rule, we continue to evaluate whether there are additional reduction opportunities in the sector that can be achieved by regulatory or nonregulatory tools. The agency is also currently devoting resources to conducting the eight-year review of the new source performance standards applicable to municipal solid-waste landfills. We anticipate that any revision of this standard would result in significant additional greenhouse-gas benefits. In contrast to the electricity-generating sector, the coal-mines category represents about 1 percent of total 2011 U.S. greenhouse-gas emissions.[11]

A decision to list and then promulgate standards for the coal-mines category would divert resources from other higher-priority activities that the EPA is currently undertaking, which would halt or slow that work. Based on its experience, the EPA anticipates that proposing and finalizing a determination regarding emissions from coal mines would likely require significant agency time and resources. To consider making a finding under Clean Air Act 111(b)(1)(A), the EPA would need to characterize emissions from the coal-mining sector; review and evaluate climate change scientific-assessment literature issued since the 2009 endangerment finding established that six key well-mixed greenhouse gases in the atmosphere threaten the public health and welfare of current and future generations; and

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[2] U.S. Environmental Protection Agency, *Draft Inventory of U.S. GHG Emissions and Sinks 1990-2011*. (2013).
[3] 74 Fed. Reg. 49454 (Sep. 28, 2009).
[4] 75 Fed. Reg. 74152 (Nov. 30, 2010).
[5] 75 Fed. Reg. 25324 (May 7, 2010).
[6] 76 Fed. Reg. 57106 (Sep. 15, 2011).
[7] 76 Fed. Reg. 74854 (Dec. 1, 2011).
[8] 77 Fed. Reg. 62624 (Oct. 15, 2012).
[9] Electricity-generating units represented approximately one-third of 2011 U.S. greenhouse-gas emissions and are the largest direct stationary-source emitters of greenhouse gases. *Supra* note 2.
[10] 77 Fed. Reg. 49490 (Aug. 16, 2012).
[11] *Supra* note 2.

identify, review and evaluate scientific literature pertaining specifically to climate change and the coal-mining sector as appropriate.

If, after conducting that analysis, the agency were to decide to list coal mines under Clean Air Act 111(b)(1)(A), the statute requires that the EPA propose standards within one year of listing. Proposing standards for coal mines under Clean Air Act 111(b)(1)(B) would involve a full assessment of the technical, policy and program design questions required under Clean Air Act section 111 and completion of appropriate detailed studies and assessments pertaining to standard setting. The EPA would also need to ensure full coordination with other federal agencies with jurisdiction over coal mines, such as the Mine and Safety Health Administration, regarding worker safety implications of the technologies available for reducing coal-mine emissions, and the Bureau of Land Management, regarding leasing authorities and gas rights on federal lands.

Agencies are generally given significant discretion in ordering their priorities and directing where the agency's limited resources will be devoted. At this time and in light of the constraints discussed above, we do not conclude that the EPA's proper course of action is to reallocate resources from the agency's other priorities and actions, including those related to greenhouse gases, to act on your petition. At this point, the agency believes it must address other, higher-priority actions before it can commit to consider whether to list coal mines as a stationary-source category under the Clean Air Act 111(b)(1)(A).

IV. Conclusion

For the reasons discussed above, the EPA is denying the June 2010 petition to add coal mines to the Clean Air Act section 111 list of categories and declining to initiate the requested rulemaking at this time. This is the EPA's final agency action on this petition.

Sincerely,

Bob Perciasepe

Bob Perciasepe
Acting Administrator

Exhibit 17

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

Memorandum

TO:	Powder River Basin Coal Mine Operators
THROUGH:	David A. Finley, Administrator, Air Quality Division
FROM:	Bernie Dailey, NSR Program Manager, Air Quality Division
DATE:	February 27, 2006
RE:	PRB Coal Mine Permitting Guidance

The following guidance is offered for preparation of permit applications for coal mines in the Powder River Basin (PRB). This memo is to provide applicants guidance with respect to the Division's permit application expectations due to increased particulate levels and on going development in the PRB. The information required per this guidance is in addition to the information that has been submitted with previous permit applications. Permit applications for revisions to the existing mines or for new mines in the PRB must address the following items:

Dispersion Modeling:

- A modeling analysis is required for annual PM_{10} and NO_x with the following considerations:
- ISCLT3 model required. The use of ISCLT3 for surface mining applications has previously been negotiated and approved by EPA, and therefore meets grand fathering provisions[1].
- Meteorological data in the form of a joint frequency distribution (JFD) will be provided by the Division for each group of mines.
- PM_{10} and NO_x modeling analyses will include neighboring/regional sources.
- PM_{10} modeling analysis will consider model receptors on the LNCM border.
- NO_x modeling analysis will consider model receptors on the LNCM border, as well as a general receptor grid, based on applicant's significance area.
- A NO_x significance analysis shall be submitted, which includes emissions from NO_x sources at the mine, including the rail loop(s), to develop the 1 microgram/cubic meter ($\mu g/m^3$) annual NO_x isopleth using a 500-meter resolution (receptor spacing). The receptors which fall inside the one (1) $\mu g/m^3$ isopleth constitute the general receptor grid.
- Utilize the "Mine A/Mine B" policy for reporting annual PM_{10} and annual NO_x impacts.
- Provide a listing of the concentrations from each group of mines; identify the receptors where the maximum Mine A/Mine B impacts occur in the concentration plots.

- Submission of a table of point, area, and volume sources for each mine that was included in the modeling analysis. Related information shall include:

  - Emission rates for each modeled pollutant in gram/sec and ton/year quantities.
  - Source locations in Universal Transverse Mercator (UTM) coordinates, including UTM Zone, UTM (X), UTM (Y), Datum (i.e., NAD27, NAD83, ...) and Base Elevation.
  - Source release parameters for all operational scenarios in the permit application:

    For Modeled Point Sources:
    - Source ID Used in Modeling Analysis
    - Stack Emission Rate
    - Stack Release Height
    - Stack Exhaust Temperature
    - Stack Release Velocity
    - Stack Exit (Inner) Diameter

    For Modeled Area and Volume Sources:
    - Source ID Used in Modeling Analysis
    - Area or Volume Source Emission Rate
    - Source Release Height
    - Length of Haul Road segments
    - Initial Lateral Dimension (sigma-y) *
    - Initial Vertical Dimension (sigma-z) *

Note: The applicant shall include a plot of sources being modeled, including rail loops, haul roads, and mainline rail segments.

Emission Inventories:

- The PM_{10} inventory will basically remain as has been previously done. The only revision should be to include dozer and water truck emissions in all inventories. If an emission factor for an activity is not available in the Wyoming emission factors, utilize AP-42 factors.

- The NO_x inventory for surrounding mines, mainline railroads, highways, urban sources (towns), and point sources will be obtained from the 2000 NE Wyoming Inventory Database (Excel format). The NO_x source inventory is through 5/1/01, and the emissions included in the spreadsheet under NAAQS 2000 should be utilized for additional sources. Due to the rapid Coal bed Methane (CBM) development in the PRB, applicants will be required to contact the Division for a current CBM NO_x emissions inventory. The NAAQS 2000 emissions inventory represents potential emissions for the mines and point sources, and actual emissions for the mainline rail, rail loop, highway and urban sources.

- The Wyoming Ambient Air Quality Standards (WAAQS) modeling analysis for NO_x will include emissions due to blasting and diesel-fired mobile sources. Initially, the NO_x emissions data for modeling these sources will be based on the NAAQS 2000 inventory database. As new coal mine permits are issued by the Division, applicants will be required to contact the Division to obtain the most current permit for neighboring mines to supplement the emissions inventory contained in the NAAQS 2000 database.

- Initially, the NO_x emissions from each neighboring mine's rail loop(s) shall be modeled based on the NAAQS 2000 inventory. NO_x emissions from the permit applicant's rail loop(s) shall be scaled to the permitted or proposed coal production rate based on the worst-case year(s) to be modeled. Applicants must provide the scaling ratios used in calculating the rail loop emissions.

- After a neighboring mine acquires a new permit that modifies the NO_x emissions from their rail loops, subsequent applicants will be required to incorporate this new information in their modeling analysis, thereby superseding the rail loop emissions provided in the NAAQS 2000 inventory.

- Regional sources to include in the NO_x modeling analysis will be determined using the rectangular source inventory areas, attached as Figure 1; the UTM coordinates for each of the three rectangular areas are also attached. The NO_x inventory can be searched by UTM coordinates to determine the highway, mainline rail, and urban area sources to be incorporated into the modeling analyses. Applicants are required to contact the Division for a current point source emissions inventory.

- The NO_x emissions from all regional power plants (Neil Simpson I and II, Neil Simpson turbines, WYGEN 1 and 2, Two Elk Unit 1, and Wyodak) must be included in the NO_x modeling for any of the three rectangular source inventory areas.

- All permit applications shall contain the annual inventory parameters for NO_x emission estimation and the NO_x emissions estimates for the life of mine of the mine considered in the application.

- For modifications to existing mines, the permit application should contain an actual NO_x inventory for the mine considered in the application based on the previous calender year.

- The applicant shall submit a complete inventory of diesel- or gas-fired generators that are utilized within the mine seeking a permit. The inventory shall include: make, model, size of the generator, annual hours of operation, and type of service that the diesel- or gas-fired generator is employed, (i.e., light plants, water pumps, etc.). NO_x, PM_{10}, and SO_2 emissions from diesel- or gas-fired generators shall be quantified.

- Contact the Air Quality Division for specific guidance on modeling PM_{10} emissions from diesel-fired combustion sources.

- The applicant shall provide the basis for emissions data for each mine represented in the modeling analyses, (i.e., Powder River Coal Co. - Rawhide Mine; Permit MD-703, July 2002).

PM_{10} Background Concentration:

- Given the ongoing development in the Powder River Basin (PRB), coal mine applicants will need to submit and justify a background PM_{10} concentration with each permit application.

Short-Term Particulate Standards:

➜ A discussion of ambient air quality monitoring data from the applicant's mine is to be included. This discussion shall include a summary of the data for the previous three (3) years, along with accompanying coal and overburden production statistics. A map showing current locations of ambient and meteorological monitoring sites in relation to pit areas, disturbed acreage, overburden spoils, haul roads, the current LNCM boundary, and proposed LNCM boundary (as applicable) are to be included.

➜ The application should contain a discussion of ambient air quality monitoring data from the designated group of neighboring mines for the previous three years. A demonstration shall be provided to show that modifications to the applicant's mining operations will not cause or contribute to ambient violations at neighboring mine's monitoring sites.

➜ Historical ambient monitored PM_{10} concentrations can be acquired from the AIRS database. If current monitored data is required, or additional monitored data is required that is not in the AIRS database, the applicant should contact Judy Shamley in the Sheridan field office for additional ambient monitored data.

Equipment Description:

➜ The application should contain the following equipment descriptions:

- A complete list of all major mining equipment, including size, that are utilized by the mine at current production rates. A list of the additional equipment necessary to meet the increased or modified permit levels, including size, is required.

- The number and size of water trucks in use for current production levels, and the frequency that water or dust suppressant controls are applied to the haul roads. Discuss normal operating procedures for water trucks (e.g., the mine has a fleet of 5 water trucks, but they only operate 3 and the remaining 2 are backup equipment). Future plans for additional water trucks as part of any production increase should be addressed.

Open Acreage:

➜ The application must include a discussion of the land status for the current year and for the years modeled. In the discussion, include a table that summarizes disturbed acreage as follows:

- Topsoil stripping (include areas stripped for sediment control and diversions)
- Topsoil piles - assume piles from previous year and current year as disturbed
- Reclaimed areas - assume previous and current year reclamation as disturbed acreage
- Overburden stockpile areas
- Mine facility areas (excluding buildings and treated areas)
- All roads in the mine permit area
- Active coal pit areas

➜ Maps are to be submitted that delineate the various disturbance areas; the size of the areas should be noted on the maps. (Areas listed in disturbed acreage table should be included on the maps).

BACT:

- The application must address the BACT requirements of Chapter 6, Section 2(c)(v). The application shall include a discussion of all dust mitigation measures currently employed at the mine with justification that the measures comply with the BACT requirements of the regulations. Future plans for any additional control strategies or revisions to control strategies, as part of any production increase or mine plan change, should be detailed.

- The application must include a discussion of the dust control program for the previous three years as well as the current dust control program. The discussion should include the amount of water and chemical dust suppressant applied to treated roads, active work areas, stockpiles, or open acreage. The application should contain a description of the chemical dust suppressant used and the manufacturer's description of recommended application rates. Also, a summary of the total length of roads watered and total length of roads treated with chemical dust suppressants for the previous three years shall be included. A map(s) is to be included that details which roads or areas were watered and which roads or areas were treated with chemicals for the current year. Future plans for any additional control strategies, as part of any production increase or mine plan change, should be detailed.

- The application should address BACT measures to be employed on open acreage. Reclamation procedures and reclamation rates should be addressed. Potential controls from temporary reclamation or treatment of open areas should be addressed. Future plans for any additional control strategies, as part of any production increase or mine plan change, should be detailed.

- The application must summarize the dust control measures utilized at the coal preparation plant. Any modifications or new coal preparation facilities will require a demonstration that proposed controls represent BACT. Include documentation that emission sources in the prep plant are compliant with existing permit conditions such as stack tests, opacity observations, etc.

Miscellaneous:

- Submission of an action plan for those mines that have continuous monitors shall be included. The plan should include strategies to follow in case of high readings. The plan shall consider mitigation practices established to go into effect, if hourly monitored concentrations are greater than X $\mu g/m^3$ or the 24-hr avg. is greater than Y $\mu g/m^3$, for example.

- The applicant shall submit a map which identifies the locations of ambient and meteorological monitors at the mine seeking a permit; the coordinate locations of the monitors should also be provided, and referenced using UTM and/or latitude/longitude coordinates. Changes in monitor locations shall be provided in future permit applications.

- Submission of a mitigation plan dealing with coal fires shall be included. The plan shall include notification and record keeping regarding fires, (i.e., the duration of the fire, when the fire started and how long it took to extinguish it, and what actions were taken to suppress the fire.

References:

[1] SUMMARY OF PUBLIC COMMENTS AND EPA RESPONSES - 7TH CONFERENCE ON AIR QUALITY MODELING, JUNE 28 - 29, 2000; Docket A-99-05, Item V-C-01 (http://www.epa.gov/scram001/guidance/guide/response.pdf)

Exhibit 18

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Dave Freudenthal, Governor

John Corra, Director

November 10, 2008

Mr. Philip C. Dinsmoor
Manager, Environmental Services
Powder River Coal, LLC
Caller Box 3034
Gillette, WY 82717

Permit No. **MD-6375**

Dear Mr. Dinsmoor:

The Division of Air Quality of the Wyoming Department of Environmental Quality has completed final review of Powder River Coal, LLC's application to modify operations at the North Antelope Rochelle Mine (NARM). This modification proposes to increase the maximum annual coal production rate from 105 million tons per year (MMTPY) to 140 MMTPY, modify the coal progression sequence, add a third dragline for overburden removal, and to modify the Lands Necessary to Conduct Mining (LNCM) boundary. The North Antelope Rochelle Mine is located approximately twenty-five (25) miles southeast of Wright, in Campbell County, Wyoming.

Following this agency's proposed approval of the request as published October 3, 2008 and in accordance with Chapter 6, Section 2(m) of the Wyoming Air Quality Standards and Regulations, the public was afforded a 30-day period in which to submit comments concerning the proposed modification, and an opportunity for a public hearing. No comments have been received. Therefore, on the basis of the information provided to us, approval to modify the North Antelope Rochelle Mine as described in the application is hereby granted pursuant to Chapter 6, Section 2 of the regulations with the following conditions:

1. That authorized representatives of the Division of Air Quality be given permission to enter and inspect any property, premise or place on or at which an air pollution source is located or is being constructed or installed for the purpose of investigating actual or potential sources of air pollution and for determining compliance or non-compliance with any rules, standards, permits or orders.

2. That all substantive commitments and descriptions set forth in the application for this permit, unless superseded by a specific condition of this permit, are incorporated herein by this reference and are enforceable as conditions of this permit.

3. That a permit to operate, in accordance with Chapter 6, Section 2(a)(iii) of the WAQSR, is required after a 120-day start-up period in order to operate this facility.

4. That all notifications, reports and correspondences associated with this permit shall be submitted to the Stationary Source Compliance Program Manager, Air Quality Division, 122 West 25th Street, Cheyenne, WY 82002 and a copy shall be submitted to the District Engineer, Air Quality Division, 1866 South Sheridan Avenue, Sheridan, WY 82801.

5. That performance tests be conducted, in accordance with Chapter 6, Section 2(j) of the WAQSR, within 30 days of achieving a maximum design rate but not later than 90 days following initial start-up of the blending and loadout facility and a written report of the results be submitted. The operator shall provide 15 days prior notice of the test date. If a maximum design rate is not achieved within 90 days of start-up, the Administrator may require testing be done at the rate achieved and again when a maximum rate is achieved.

6. That performance tests shall be conducted on the passive enclosure dust control systems associated with the blending and loadout facility to determine compliance with Condition 7(a). Method 22 of 40 CFR part 60, Appendix A shall be used to determine fugitive particulate emissions. Performance tests shall be at least 30 minutes in duration, with observations taken from each side of the enclosure. Notification of the test date shall be provided to the Division at least fifteen (15) days prior to testing. Results shall be submitted to this Division within forty-five (45) days of completion.

7. That the following requirements shall be met for all passive enclosure control systems (PECS), atomizer/foggers, and engart dust extraction systems at the mine:

   a. The PECS, atomizer/foggers, and engart dust extraction systems shall be operated and maintained so the system enclosure exhibits no visible emissions as determined by Method 22 of Appendix A, 40 CFR part 60.

   b. That the atomizer/fogger systems, engart dust extraction system, and associated monitoring equipment shall be operated during all times that the respective coal preparation facilities are in operation.

   c. Powder River Coal, LLC shall conduct, at minimum, daily visual observations of the passive enclosure control systems (PECS) and atomizer/fogger systems to determine the presence of visible emissions. Records shall be kept documenting whether visual emissions are noted and the corrective action taken. These records shall be maintained for a period of five (5) years and shall be made available to the Division upon request. The *Truck Dump forms* shall be utilized to document any visual observations conducted (Appendix A). This form may be revised without administratively amending the permit, but revisions shall be approved by the Division prior to implementation.

8. That the coal preparation facilities are subject to Subpart Y of 40 CFR part 60. Subpart Y limits opacity from any coal processing and conveying equipment, including coal crushers and breakers, coal storage systems, and coal transfer and loading systems to less than 20 percent as determined by Method 9 of Appendix A, 40 CFR part 60.

9. That Powder River Coal, LLC shall submit a report detailing the impact of the final Subpart Y rule on the conditions of this permit. The report shall include an applicability determination with respect to the new Subpart Y regulations for each truck dump and emission unit (i.e. sources controlled with an atomizer/fogger, PEC, or engart dust extraction system).

10. That the truck dumps shall be limited to less than 20 percent opacity, per the requirements of Subpart Y. Compliance with the 20 percent opacity limit at the truck dumps will be determined by Method 9 of Appendix A, 40 CFR part 60.

11. That Powder River Coal, LLC shall conduct, at minimum, quarterly Method 9 observations (one 6-minute average) of the truck dumps to measure the opacity of any fugitive emissions. The Method 9 observations shall be conducted by a qualified observer certified in accordance with Section 3.1 of Method 9 and shall follow the requirements and procedures of Method 9 as contained in Appendix A, 40 CFR part 60.

12. That Powder River Coal, LLC shall conduct, at minimum, weekly inspections of the truck dump control systems installed at each of the truck dumps to determine any repair measures necessary to minimize fugitive dust emissions and maintain proper operation of each control system. Corrective action and repair measures must be initiated in an expeditious manner when the control device is determined to be improperly maintained or operated.

13. The coal truck dump pads shall be cleaned, treated, and maintained to minimize the coal fines that accumulate due to spillage from the trucks. Cleaning practices or treatment of the road surfaces shall be maintained on a continuous basis to the extent that cleaning or the surface treatment remains a viable control measure that will be adequate to control dust problems.

14. That the West Truck Dump facilities may only be used when the Middle Pit Truck Dump facilities are not in operation. Powder River Coal, LLC shall keep records of dates, duration and reason for use of the West Truck Dump facilities. Records shall be kept on site and shall be submitted with the annual report required for dust control measures in Condition 17.

15. That all permanent haul roads shall be treated with a chemical dust suppressant in addition to water to control fugitive dust emissions and shall be maintained continuously to the extent that such treatment remains a viable control measure.

16. That all temporary haul routes, including pit floor haul routes, shall be treated with water and/or chemical dust suppressants on a schedule such that treatment remains a viable control measure.

17. That Powder River Coal, LLC shall submit to the Division by April 1st of each year, a report addressing road dust control measures employed during the past year and a disturbed acreage report for the year. This plan shall include the following:

    a. A map based on the past year end conditions with the following information:
        - All roads existing at the end of the calendar year, which have been treated with water and/or dust suppressant.
        - Locations of active operations, treated disturbed areas, and reclaimed areas.

    b. Type and annual quantity of dust suppressants used for the past year and a description of the general application procedures and schedule.

    c. Number of water trucks, capacities of each water truck, and quantity of water used for the past year.

    d. Operating hours by water truck and total water truck fleet hours for the past year.

    e. Total length in miles of permanent and temporary haul roads existing at the end of the calendar year, which have been treated with water and/or dust suppressant.

    f. Overburden and coal production rates for the past year.

    g. A table summarizing, by calendar quarter, the acreages and control measures or BMP uses/applied by active operations, treated disturbed areas, and reclaimed areas.

18a. Topsoiled areas greater than or equal to 150 contiguous acres that will not be revegetated within 60 days of topsoil laydown and regraded backfill areas greater than or equal to 150 contiguous acres that will not be topsoiled within 60 days, shall be ripped or chiseled to create a roughened surface, seeded with a temporary vegetative cover, or otherwise effectively stabilized against wind erosion.

18b. Topsoiled areas less than 150 contiguous acres that will not be immediately revegetated and regraded backfill areas less than 150 contiguous acres that will not be topsoiled for an extended period of time, shall be ripped or chiseled to create a roughened surface, seeded with a temporary vegetative cover, or otherwise effectively stabilized against wind erosion as soon as feasible.

19. That Power River Coal, LLC shall, at minimum, stabilize 30 percent of the actual open acres at the North Antelope Rochelle Mine against wind erosion on a calendar year basis. Powder River Coal, LLC shall determine the percent of acreage stabilized at the North Antelope Rochelle Mine on a quarterly basis. The percent of acreage stabilized shall be determined by taking the total number of open acres stabilized during the quarter divided by the number of actual open acres at the end of the quarter. Compliance with this condition shall be determined by taking the average of the quarterly percent of acreage stabilized for the year. A report on the percent of acreage stabilized shall be submitted along with the annual report required for dust control measures in Condition 17. The frequency of determining the percent of acreage stabilized may be revised without amending the permit, but revisions to the frequency must be approved by the Division prior to implementation.

20. That Powder River Coal, LLC shall utilize a program to mitigate coal fires that result from spontaneous combustion. Attempts to extinguish coal fires must be initiated within 24 hours of discovering the fire and pursued until the fire is extinguished, unless operational safety issues are present. For all coal fires where efforts to extinguish the fire were not initiated within 24 hours or for fires which were not extinguished within 24 hours of the initial attempt to extinguish the fire, Powder River Coal, LLC shall document the measures taken to extinguish the fire and the reasons for any delays.

21. That Powder River Coal, LLC shall operate, in accordance with the requirements of 40 CFR parts 50 and 58 an approved ambient particulate monitoring program that includes an ambient PM_{10} monitoring network at the North Antelope Rochelle Mine to demonstrate compliance with the ambient particulate standards in Chapter 2, Section 2 of the WAQSR. Powder River Coal, LLC shall maintain a quality assurance plan for the monitoring network, as required by 40 CFR part 58 and shall be approved by the Division.

22. Powder River Coal, LLC shall comply with all commitments made in the quality assurance plan for the ambient PM_{10} monitoring network in Condition 21 for the North Antelope Rochelle Mine, and the data generated by the ambient PM_{10} monitoring network shall be submitted in a Division approved format on a quarterly basis, within 60 days following the end of the quarter.

23. Powder River Coal, LLC shall notify the Division within 15 days of a monitored exceedance at any of the TEOM monitors and within 30 days of a monitored exceedance at any filter based monitor in the ambient PM_{10} monitoring network at the North Antelope Rochelle Mine.

24. That annually, Powder River Coal, LLC shall submit to the Division, a demonstration that the ambient PM_{10} monitoring network is sufficient for monitoring impacts and demonstrating compliance with the ambient particulate standards in Chapter 2, Section 2 of the WAQSR from current as well as future (5-year projection) mining activities. This demonstration shall consist of a discussion of the ambient monitoring network along with an annual windrose, and current UTM coordinate locations of the monitors. In addition, a map showing current monitor locations in relation to active mining areas along with projected mining areas shall be included. The ambient monitoring network demonstration shall be submitted along with the annual report required for dust control measures in Condition 17, and a copy shall be submitted to the Air Quality Monitoring Program located in Cheyenne.

25. That Powder River Coal, LLC shall adhere to their contingency action plan for high particulate events at the North Antelope Rochelle Mine. A copy of this plan titled *Air Quality Action Plan* is attached in Appendix B. The contingency action plan for high ambient particulate impacts may be revised without administratively amending the permit, but revisions shall be approved by the Division prior to implementation.

26. That Powder River Coal, LLC shall submit, if required by the Administrator, a demonstration that their *Air Quality Action Plan* will adequately minimize high ambient particulate impacts. The Administrator may require Powder River Coal, LLC to propose modification to their *Air Quality Action Plan* based on the action plan demonstration.

27. That Powder River Coal, LLC shall document the measures taken when an action level is triggered in their *Air Quality Action Plan* in Condition 25.

28. That Powder River Coal, LLC shall maintain a meteorological station at the North Antelope Rochelle Mine acceptable to the Division. Surface air meteorological data measurements shall be collected at the North Antelope Rochelle Mine, as specified in the EPA document: Meteorological Monitoring Guidance for Regulatory Modeling Applications. The meteorological data measurements shall consist of hourly observations of:

    a. Wind speed using an anemometer height of 10 meters
    b. Wind direction
    c. Ambient temperature

29. The meteorological data specified in Condition 28 shall be submitted in an electronic format on a quarterly basis and shall be compiled in a joint frequency distribution (JFD) utilizing the modified sigma theta method for stability.

30. That Powder River Coal, LLC will limit public access to the lands defined by the Administrator as necessary to conduct mining operations. Limiting public access will include posting of fences with signs posted at one quarter mile intervals identifying the enclosed area and prohibiting access, locked gates and security at all mine entrances. The signs will identify the mine operator and inform the public of the restricted area. The Administrator has determined that the Lands Necessary to Conduct Mining boundary is described on a map titled *North Antelope Rochelle Mine – Coal Progression Map* which is shown in Figure 1.

31. The maximum coal production by year at the North Antelope Rochelle Mine shall not exceed a production rate of 140 million tons per year. Mining may continue through the year 2021 as described in the mine plan contained in the application for this permit.

32. That Powder River Coal, LLC shall retain, at the North Antelope Rochelle Mine, records of the daily inspections, monthly observations, PM records, Method 22 observations, and support information as required by this permit for a period of at least five (5) years from the date such records are generated and the records shall be made available to the Division upon request.

33. That this permit shall supersede all previous Chapter 6, Section 2 permits and waivers issued for the North Antelope Rochelle Mine.

It must be noted that this approval does not relieve you of your obligation to comply with all applicable county, state, and federal standards, regulations or ordinances. Special attention must be given to Chapter 6, Section 2 of the Wyoming Air Quality Standards and Regulations, which details the requirements for compliance with conditions 3 and 5. Any appeal of this permit as a final action of the Department must be made to the Environmental Quality Council within sixty (60) days of permit issuance per Section 16, Chapter I, General Rules of Practice and Procedure, Department of Environmental Quality.

If we may be of further assistance to you, please feel free to contact this office.

Sincerely,

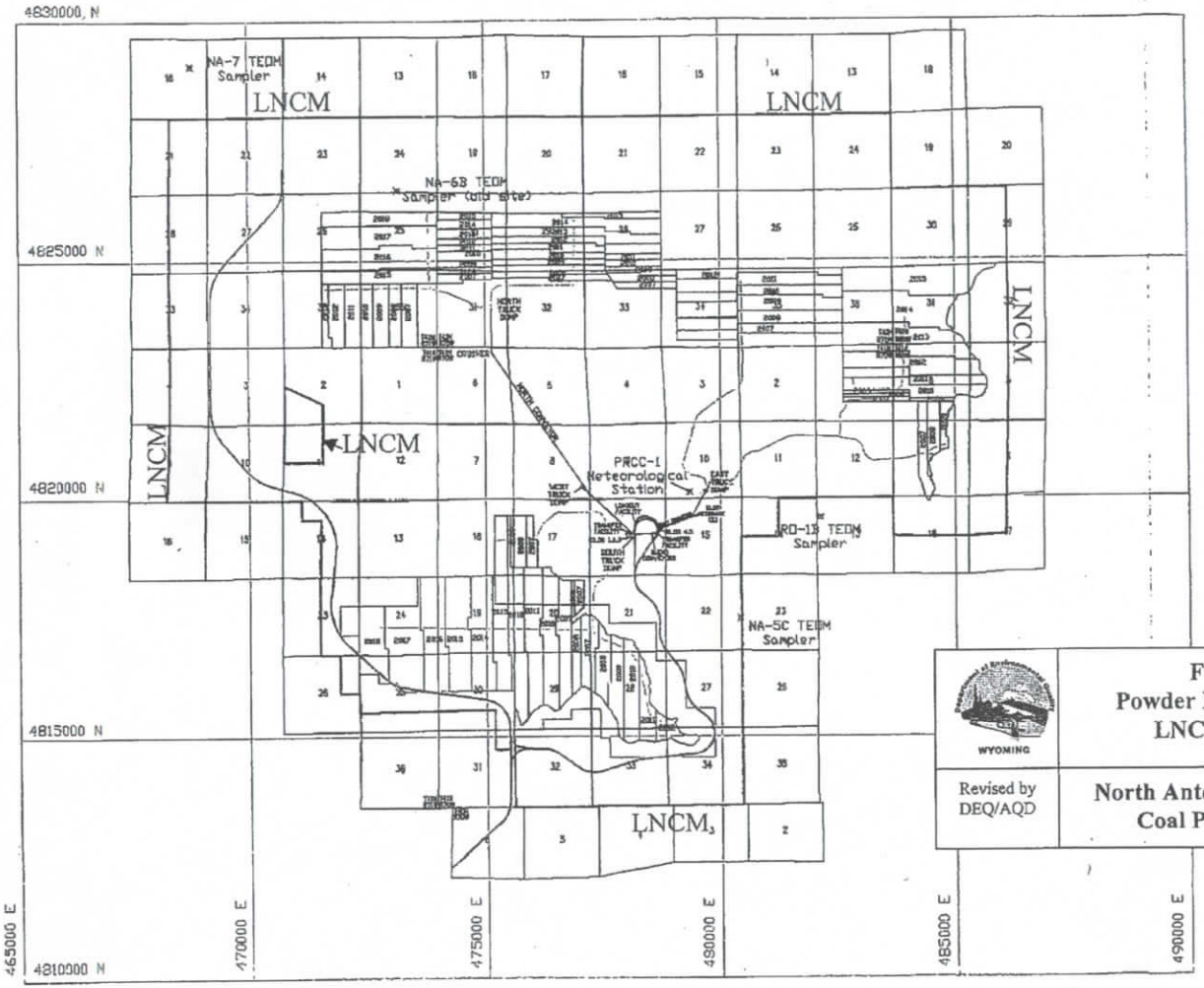
David A. Finley
Administrator
Air Quality Division

John V. Corra
Director
Dept. of Environmental Quality

cc: Tanner Shatto

Figure 1

Lands Necessary to Conduct Mining Boundary



WYOMING

FIGURE 1
Powder River Coal, LLC
LNCM Boundary

Revised by DEQ/AQD

North Antelope Rochelle Mine
Coal Progression Map

APPENDIX A

VISIBLE EMISSIONS FORM/REPORTS

TRUCK DUMP

DATE:_____ SHIFT: Days Nights

COMPLETED BY:_____ SUPERVISOR:_____

	O.K.	B.O.
FEEDERS:		
Grease all bearings--10 pumps	_____	_____
Check gearbox oil levels	_____	_____
Check chain case oil level	_____	_____
Grease all bushings--10 pumps	_____	_____
Check condition of rollers and plates	_____	_____
Check condition of feeder arms	_____	_____
CRUSHERS:		
Inspect drive belts and chains	_____	_____
Record nitrogen pressure at bottles	_____ psi	
Record nitrogen pressure on east crusher	_____ psi	
Record nitrogen pressure on west crusher	_____ psi	
Check shims on crusher stops	_____	_____
Check hydraulic levels and filters	_____	_____
Wash out behind bearings and guides	_____	_____
Take bearing temperatures and record	_____	_____
Grease all bearings until purged	_____	_____
Grease all seals--5 pumps or 3 sec.	_____	_____
Inspect starvalve and agglomorator for proper operation	_____	_____
SILO FEED BELTS:		
Grease tail pulley--18 pumps	_____	_____
Grease live idlers bearings--5 pumps	_____	_____
Inspect V-plow	_____	_____
Inspect belt skirting and adjust	_____	_____
Inspect tail pulley for defects	_____	_____
Inspect belt condition for defects	_____	_____
Inspect idlers from tail end to drive house	_____	_____
Check sump pumps for proper operation	_____	_____
INSPECT GREASE SYSTEM:	_____	_____
Check condition	_____	_____
STILLING SHED:		
Check condition (flush with Stilling Shed)	_____	_____
CLEAN MCC:	_____	_____
ATOMIZER SPRAY SYSTEM:		
Inspect spray system for proper operation	_____	_____
Visible dust coming from building	YES	NO
If NO note corrective action in "COMMENTS" area		
ELEVATOR:		
Check radio	_____	_____
Check safety belts--3	_____	_____

Other _____

DAILY CRUSHER BEARING TEMPERATURE INSPECTION

CRUSHER I.D. #1

#1	#2
#3	#4
#5	#6
#7	#8

CRUSHER I.D. #2

#1	#2
#3	#4
#5	#6
#7	#8

	O.K.	B.O.
Check oil levels	_____	_____
Drain moisture from trap areas	_____	_____
Inspect drive belts	_____	_____
Blow out intake filters (replace if needed)	_____	_____
Insure mounting bolts are secure	_____	_____

WEST DRIVE HOUSE

WEST PLANT:		
Check gearbox oil levels	_____	_____
Inspect belt condition	_____	_____
Inspect idlers and all pulleys for defects	_____	_____
Grease counterweight bearings--18 pumps	_____	_____
Grease bend pulley bearings--18 pumps	_____	_____
Inspect idlers to top of silo	_____	_____
Check cooling fan	_____	_____
Inspect V-plow	_____	_____
Grease live shaft bearings--5 pumps	_____	_____
Grease drive pulleys--18 pumps	_____	_____

SAFETY CHECKLIST

- ☐ Pullcords
- ☐ Fire Extinguisher
- ☐ Evacuation Plans
- ☐ Start-up Horns
- ☐ Lighting

REPORT ANY PROBLEMS WITH ITEMS TO SUPERVISOR IMMEDIATELY!

COMMENTS:

_____

_____

_____

_____

_____

_____

_____

_____

_____

WEST TRUCK DUMP
DAY SHIFT

DATE: _____

	YES	NO	INITIAL
HOUSE KEEPING START OF SHIFT (IF B/O EXPLAIN)	____	____	____
WALKWAYS FREE OF COAL CHUNKS & OTHER DEBRIS	____	____	____
WASH DOWN COMPLETED THIS SHIFT (IF NO EXPLAIN)	____	____	____
TIME OF DAY AREA WASHED 1 2 3 4			____
Spray bars need to be in use if Outside Temp is 40 degrees or above.	____	____	____
Wash Down hoses free of grease.	____	____	____
Garbage cans emptied.	____	____	____
Check shadow board (List any missing items)	____	____	____
Clean MCC if needed.	____	____	____
STILLING SHED			
Holes in walls/bent iron/lighting.	____	____	____
Door operational. If NO; conduct opacity reading (Contact Environmental).	____	____	____
ELEVATOR			
Inspect for defects. (Lights,door)	____	____	____
Friday Dayshift only /grease elevator rack.	____	____	____
GROUND LEVEL OUTSIDE			
Inspect Truck Dump vent fan for proper operation and purge bearings.	____	____	____
NITROGEN BOTTLE MANIFOLD	____	____	____
Gauges legible. (If not replace)	____	____	____
Replace bottles if there is Less than 400 PSI in them.	____	____	____
DO NOT USE OXYGEN IN PLACE OF NITROGEN.			
	O.K.	B.O.	
TOP FLOOR			
Feeder slide gate hydraulic unit oil level. (Add oil if needed use 10 weight)	____	____	____
Apron Feeders:	____	____	____
Grease injectors. (REPLACE ANY B/O INJECTORS)	____	____	____
Inspect all grease lines. (REPAIR ANY BROKEN LINES)	____	____	____
Inspect Manual air grease system.	____	____	____
Grease all bearings until purged through injectors.	____	____	____
Inspect Zero speed switches. (Remove excess grease)	____	____	____
Check color of all gear box desiccant air breathers(Replace if dark green)MMS#72003288 or 483-29270	____	____	____
EAST			
Inspect Feeder flights. (missing bolts/bent or broken flights).	____	____	____
Inspect Feeder chain tension and guide rollers.Clean any coal accumulation from rollers.	____	____	____
Inspect Scraper bar condition.	____	____	____
Inspect Scraper chain tension/condition.	____	____	____
East Feeder gearbox oil level. (SYNCON 220)	____	____	____
Add oil if needed. (NOTE IF OIL IS MILKY)	____	____	____
East Scraper gearbox oil level. (SYNCON 220)	____	____	____
Add oil if needed. (NOTE IF OIL IS MILKY).	____	____	____
Oil leaking from gearboxes. (Note location of any leaks)	____	____	____
WEST			
Inspect Feeder flights. (Missing bolts/bent or broken flights)	____	____	____
Inspect Feeder chain tension and guide rollers.Clean any coal accumulation from rollers.	____	____	____
Inspect Scraper bar condition.	____	____	____
Inspect Scraper chain tension/condition.	____	____	____
West Feeder gearbox oil level. (SYNCON 220)	____	____	____
Add oil if needed. (NOTE IF OIL IS MILKY)	____	____	____
West Scraper gearbox oil levels. (SYNCON 220)	____	____	____
Add oil if needed. (NOTE IF OIL IS MILKY)	____	____	____
Oil leaking from gearboxes. (Note location of any leaks)	____	____	____
Inspect Foam system West feeder. (Check for proper consistency)	____	____	____
Inspect Foam system East feeder. (System making shaving cream)	____	____	____
Inspection doors and guards. (Broken hinges, leaks ,etc)	____	____	____

REVISED 1/11/08

MIDDLE FLOOR

CRUSHERS	YES	NO	INITIAL
Crushers must be locked out and tagged before entering guarded area.	____	____	____
Crushers guards. (In Place)	____	____	____
Visually inspect all electric motor connection boxes for any defects.	____	____	____
Crushers closed.	____	____	____
Check shims on Crusher stops.	____	____	____
Inspect moveable bearing spring tension gap. (Note if less than 3/8")	____	____	____
Inspect drive belts. (Note number of belt strands missing per belt)	____	____	____
Unusual vibrations, sounds etc?	____	____	____
Wash out behind bearings and guides as production allows.	____	____	____
Grease all crusher bearings until purged through injectors. (USING MANUAL AIR GREASE SYSTEM)	____	____	____
Inspect grease injectors. (REPLACE ANY B/O INJECTORS)	____	____	____
Inspect grease lines. (REPLACE ANY B/O LINES)	____	____	____

GREASE SYSTEM			
Tank level. (Notify SLS on Channel 11 if tank needs filled)	____	____	____
Pressure gauges legible. (IF B/O REPLACE)	____	____	____
System air pressure set NO higher than75 PSI working pressure.	____	____	____
Cycle system manually. (Builds 2000-3000 PSI before relieving)	____	____	____
Inspect Manual air grease system.	____	____	____
Drain water separator add air tool oil if needed.	____	____	____
Clean inside of grease injector boxes.	____	____	____

HYDRAULIC / NITROGEN SYSTEMS			
Crushers must be locked out and tagged before entering guarded area.	____	____	____
Valves open to Crusher surge tank bottles.	____	____	____
Visually inspect hydraulic oil tanks for leaks if crusher is running,if down check oil level.	____	____	____
West Crusher: Oil level in tank. (10 WEIGHT OIL)	____	____	____
Add oil if needed. (NOTE IF OIL IS MILKY)	____	____	____
East Crusher: Oil level in tank. (10 WEIGHT OIL)	____	____	____
Add oil if needed. (NOTE IF OIL IS MILKY)	____	____	____
DO NOT USE OXYGEN IN PLACE OF NITROGEN.	____	____	____
Record Nitrogen pressure West Crusher.	____psi	____	____
(SET AT 200 PSI) NOTE IF OTHER THAN 200	____	____	____
Record Nitrogen pressure East Crusher.	____psi	____	____
(SET AT 200 PSI) NOTE IF OTHER THAN 200	____	____	____

BOTTOM FLOOR(801 BELT)			
Inspect Tail pulley for defects.	____	____	____
Inspect Live shaft for defects.	____	____	____
Inspect grease lines. (REPLACE ANY B/O LINES)	____	____	____
Grease ALL Tail pulley & Live shaft idler bearings until purged.	____	____	____
Inspect V-plow.	____	____	____
Inspect skirt boards.	____	____	____
Inspect belt for defects and tracking problems. (If misaligned align it).	____	____	____
Inspect idlers to Drive house	____	____	____
Clean any coal accumulation from idlers ,impact zones and pulleys	____	____	____
Sump pumped down. (Clean sump out if needed.)	____	____	____
Sump grating in place.	____	____	____
Crusher fines chute water manifold being used.	____	____	____
French drain adjustment. Open_____ Closed_____ Pinched Down_____			
Reject screw conveyor in working order.	____	____	____
Atomizer spray system.			
Working properly Y/N	____	____	____
Filters	____	____	____
Spray nozzles. (Spray nozzles on conveyors must be checked with belt locked out)	____	____	____
Leaks air/water	____	____	____

DAILY CRUSHER BEARING TEMPERATURE INSPECTION

NOTIFY SUPERVISOR OF ANY BEARINGS OVER 120 DEGREES

CRUSHER I.D. West		CRUSHER I.D. East	
#1	#2	#1	#2
#3	#4	#3	#4
#5	#6	#5	#6
#7	#8	#7	#8

West Truck Dump Air Compressor	YES	NO	INITIAL
Check oil levels.			
(Add oil if needed Use ONLY Quinsyn Plus)			
Drain moisture from trap areas.			
Blow out intake filters. (Replace if needed)			
Compressor room clean.			

WEST M&E SHOP Air Compressor			
Check oil levels.			
(Add oil if needed Use ONLY IR Ultra)			
Drain moisture from trap areas.			
Blow out intake filters. (Replace if needed)			
Compressor room clean.			

SAFETY CHECKLIST

OK	
	Guards
	Pullcords
	Fire Extinguisher
	Evacuation Plans
	Start-up Horns
	Lighting
	PPE(earplugs,respirators available)
	Lockout tags available
	Salt cans full
	Belt misalignment switches(If B/O identify location in comment section)

REPORT ANY PROBLEMS WITH ITEMS TO SUPERVISOR IMMEDIATELY!
PLEASE NOTE ANYTHING THAT WAS NOT COMPLETED AND WHY

COMMENTS _____

EXPLANATIONS _____

OPERATOR 1ST HALF _____
EMPLOYEE # _____
SIGNATURE _____
SUPERVISOR _____

OPERATOR SECOND HALF _____
EMPLOYEE # _____
SIGNATURE _____
SUPERVISOR _____

APPENDIX B

Air Quality Action Plan

An automated alarm system will sound an alarm at the Security Office if monitored emissions elevate to a level of concern. When hourly values are found to be above 250 $\mu g/m^3$ but below 500 $\mu g/m^3$ or the 24-hour values are above 75 $\mu g/m^3$ but below 100 $\mu g/m^3$ alarm level, operations personnel will determine possible emission source areas at and surrounding the mine in addition to monitoring hourly reading trends. Certain factors such as the weather forecast and actual wind speed and direction are checked. Preparatory actions are implemented as necessary. The actions may include determining the availability and staffing of water trucks, the nature and location of any contractor activities, or optional digging or haulage plans.

When a one-hour concentration exceeds 500 $\mu g/m^3$ or the 24-hour value exceeds 100 $\mu g/m^3$, the response to these alarms will include, but may not be limited to, inspection of the immediate vicinity of the monitors, focused chemical and water treatment in active mine areas, and if necessary, temporary realignment or suspension of certain mine activities that are determined to contribute to the levels of concern. If the source(s) is not at the North Antelope Rochelle Mine and continues to be a significant contributor of emissions, personnel will document the source(s) and contact AQD, when possible.

Exhibit 19

Petition for Issuance of Rules Adopting Permanent Program Environmental Protection Performance Reclamation Act, 30 U.S.C. § Standards to Limit Nitrogen Oxide Air Pollution from Blasting Operations at Surface Coal Mining Operations Under 30 C.F.R. §§ 816 and 817

Montana Department of
ENVIRONMENTAL QUALITY

Brian Schweitzer, Governor

P. O. Box 200901 Helena, MT 59620-0901 (406) 444-2544 Website: www.deq.mt.gov

March 25, 2010

Darrel Myran
Westmoreland Resources
P.O. Box 449
Hardin, MT 59034

Dear Mr. Myran:

Montana Air Quality Permit #1418-06 is deemed final as of March 25, 2010, by the Department of Environmental Quality (Department). This permit is for Westmoreland Resources, Inc., Absaloka Mine. All conditions of the Department's Decision remain the same. Enclosed is a copy of your permit with the final date indicated.

For the Department,

Vickie Walsh

Vickie Walsh
Air Permitting Program Supervisor
Air Resources Management Bureau
(406) 444-3490

Julie A Merkel

Julie Merkel
Air Quality Specialist
Air Resources Management Bureau
(406) 444-3626

VW: JM
Enclosures

Montana Department of Environmental Quality
Permitting and Compliance Division

Montana Air Quality Permit #1418-06

Wesmoreland Resources, Inc.
Absaloka Mine.
P.O. Box 449
Hardin, MT 59034

March 25, 2010

MONTANA AIR QUALITY PERMIT

Issued To:	Westmoreland Resources P.O. Box 449 Hardin, MT 59034	MAQP: #1418-06 Application Complete: 11/30/09 Preliminary Determination Issued: 01/08/10 Department Decision Issued: 3/9/10 Permit Final: 3/25/10 AFS #: 003-0002

A Montana Air Quality Permit (MAQP), with conditions, is hereby granted to Westmoreland Resources, Inc. (Westmoreland), pursuant to Sections 75-2-204 and 211 of the Montana Code Annotated (MCA), as amended, and Administrative Rules of Montana (ARM) 17.8.740, *et seq.*, as amended, for the following:

SECTION I: Permitted Facilities

A. Plant Location

Westmoreland operates the Absaloka Mine, which is a surface coal mine and handling facility. The Absaloka Mine is located about 30 miles east of the city of Hardin. The general legal description of the permit area is as follows: All or portions of Sections 23, 24, 25, 26, 35, and 36 in Township 1 North, Range 37 East; Sections 19, 20, 21, 29, 30, 31, and 32 in Township 1 North, Range 38 East, in Big Horn County, Montana.

B. Current Permit Action

On November 30, 2009, the Montana Department of Environmental Quality – Air Resources Management Bureau (Department) received a complete application from Bison Engineering (Bison) on behalf of Westmoreland requesting a modification to MAQP #1418-04. The modification is in response to a letter from the Department dated August 28, 2009, requesting Westmoreland to update the facility's MAQP to reflect equipment currently on site. Although the diesel-fired generator equipment was originally permitted as "associated equipment", Westmoreland consistently reported emissions from this equipment in its annual emissions inventory reports. However, when this equipment is added to the MAQP's emissions inventory, Westmoreland's potential emissions are above the Title V Operating Permit threshold. Therefore, Westmoreland requested federally enforceable limits to keep the facility's potential emissions below the Title V Operating Permit threshold. A complete list of equipment is found in the Permit Analysis.

SECTION II: Conditions and Limitations

A. Emission Limitations

1. Westmoreland shall be limited to a maximum production of 11,000,000 tons of coal on a 12-month rolling period (ARM 17.8.749).

2. Westmoreland shall be limited to a maximum process flow of 3,000 tons of coal per hour from the truck dump into the storage shed (ARM 17.8.749).

3. Westmoreland shall be limited to a maximum process flow of 4,000 tons of coal per hour from the storage shed into the train loading hopper (ARM 17.8.749).

4. Westmoreland shall be limited to a maximum process flow of 2,000 tons of coal per hour diverted from the Storage Reclaim Conveyor at the Rail Loadout Structure into the Coal Storage Silo at the Truck Loadout facility (ARM 17.8.749).

5. Westmoreland shall not cause or authorize emissions to be discharged into the outdoor atmosphere from any sources installed after November 23, 1968, that exhibit an opacity of 20% or greater averaged over 6 consecutive minutes (ARM 17.8.304).

6. Westmoreland shall comply with all applicable standards, limitations, and the reporting, record keeping, and notification requirements contained in 40 CFR 60, Subpart Y, Standards of Performance for Coal Preparation Plants (ARM 17.8.340 and 40 CFR 60, Subpart Y).

7. Westmoreland shall not cause or authorize the use of any street, road, or parking lot without taking reasonable precautions to control emissions of airborne particulate matter (ARM 17.8.308).

8. Westmoreland shall treat all unpaved portions of the haul roads, access roads, parking lots, or general plant area with water and/or chemical dust suppressant as necessary to maintain compliance with the reasonable precautions limitation in Section II.A.7 (ARM 17.8.749).

9. Westmoreland shall maintain and operate the facility with the following emission control technologies and management practices (ARM 17.8.749):

   a. Coal Conveyors – All conveyor belts shall be covered on three sides. Belt transfer points shall be hooded.

   b. Primary Crusher, Secondary Crusher, and Screen – Primary and secondary crushers shall be enclosed. Feed points to the crushers and secondary crusher screen shall be hooded.

   c. Coal Storage – 50,000 tons coal storage pile enclosed in a storage barn.

   d. Open Coal Storage – Water or equivalent dust suppressant on open coal storage as necessary.

   e. Train and Truck Loadout – Minimize the free fall distance by the use of a retractable loading chute.

   f. Overburden and Interburden Removal – Minimize the fall distance from the dragline bucket to the spoil pile.

   g. Coal Removal – Minimize fall distance from the front-end loader or shovel to the haul trucks.

   h. Coal and Overburden Drilling – Use water injection on the drills.

   i. Coal and Overburden Blasting – Minimize overshooting and minimize the area to be blasted.

j. Haul Roads – Chemical dust suppressant or equivalent shall be used. Westmoreland shall submit to the Department for approval, a plan for implementation of dust suppression. The plan shall be submitted by November 1, 1980.

k. Access Road – Water or equivalent dust suppression to be employed on the access roads.

l. Topsoil Removal and Exposed Areas – Topsoil stripping to precede mining as closely as practicable. Reclaim overburden and interburden piles as closely behind the mining operation as possible.

m. Truck Dump – Bottom dump coal haulers to minimize drop distances.

10. Westmoreland shall not burn coal in the boilers containing more than the following limits, and the monthly train composite data may be utilized to represent the quality of coal used in the boilers (ARM 17.8.749):

    a. 0.8% sulfur by weight, monthly average, on an as-received basis; and

    b. 11.0% ash by weight, monthly average, on an as-received basis.

11. Westmoreland shall not exceed 1500 tons per year combined maximum coal usage in the existing two coal-fired boilers (ARM 17.8.749).

12. Westmoreland's steam production rates shall be limited to a maximum of 8,600 pounds per hour from each boiler (ARM 17.8.749).

13. Soot blowing shall be done once per eight-hour shift by manually opening and closing air valves to the front and back blow-down units and actuators (ARM 17.8.749).

14. Boiler ash shall not be disposed of at a location where wind may cause the material to become airborne (ARM 17.8.749).

15. Westmoreland shall not exceed 240,000 gallons per year combined fuel usage in the diesel-fired generators (ARM 17.8.749).

B. Testing Requirements

1. All compliance source tests shall conform to the requirements of the Montana Source Test Protocol and Procedures Manual (ARM 17.8.106).

2. The Department may require further testing (ARM 17.8.105).

C. Operational Reporting Requirements

1. Westmoreland shall supply the Department with annual production information for all emission points, as required by the Department in the annual emission inventory request. The request will include, but is not limited to, all sources of emissions identified in the emission inventory contained in the permit analysis. Production information shall be gathered on a calendar-year basis and submitted to the Department by the date required in the emission inventory request. Information shall be in the units required by the Department. This information may be used to calculate operating fees, based on actual emissions from the facility, and/or to verify compliance with permit limitations (ARM 17.8.505).

2. Westmoreland shall notify the Department of any construction or improvement project conducted pursuant to ARM 17.8.745, that would ***include the addition of a new emitting unit***, a change in control equipment, stack height, stack diameter, stack flow, stack gas temperature, source location or fuel specifications, or would result in an increase in source capacity above its permitted operation or the addition of a new emission unit. The notice must be submitted to the Department, in writing, 10 days prior to start up or use of the proposed de minimis change, or as soon as reasonably practicable in the event of an unanticipated circumstance causing the de minimis change, and must include the information requested in ARM 17.8.745(1)(d) (ARM 17.8.745).

3. All records compiled in accordance with this permit must be maintained by Westmoreland as a permanent business record for at least 5 years following the date of the measurement, must be available at the plant site for inspection by the Department, and must be submitted to the Department upon request (ARM 17.8.749).

4. Westmoreland shall document, by month, the tons of coal production. By the 25th day of each month, Westmoreland shall total the tons of coal production for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.1. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

5. Westmoreland shall document, by month, the tons of coal usage in the two coal-fired boilers. By the 25th day of each month, Westmoreland shall total the tons of coal usage for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.11. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

6. Westmoreland shall document, by month, the gallons of diesel fuel usage for the diesel generators/engines. By the 25th day of each month, Westmoreland shall total the gallons of diesel fuel usage for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.15. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

7. Westmoreland shall annually certify that its annual emissions are less than those that would require a source to obtain an air quality operating permit as required by ARM 17.8.1204(3)(b). The annual certification shall comply with the annual certification requirements of ARM 17.8.1207. The annual certification should be submitted along with annual emission inventory information (ARM 17.8.749 and ARM 17.8.1204).

D. Ambient Monitoring Requirements

The Department may require Westmoreland to conduct additional ambient monitoring if necessary.

SECTION III: General Conditions

A. Inspection – Westmoreland shall allow the Department's representatives access to the source at all reasonable times for the purpose of making inspections or surveys, collecting samples, obtaining data, auditing any monitoring equipment (CEMS, CERMS) or observing any monitoring or testing, and otherwise conducting all necessary functions related to this permit.

B. Waiver – The permit and the terms, conditions, and matters stated herein shall be deemed accepted if Westmoreland fails to appeal as indicated below.

C. Compliance with Statutes and Regulations – Nothing in this permit shall be construed as relieving Westmoreland of the responsibility for complying with any applicable federal or Montana statute, rule, or standard, except as specifically provided in ARM 17.8.740, *et seq*. (ARM 17.8.756).

D. Enforcement – Violations of limitations, conditions and requirements contained herein may constitute grounds for permit revocation, penalties, or other enforcement action as specified in Section 75-2-401, *et seq*., MCA.

E. Appeals – Any person or persons jointly or severally adversely affected by the Department's decision may request, within 15 days after the Department renders its decision, upon affidavit setting forth the grounds therefore, a hearing before the Board of Environmental Review (Board). A hearing shall be held under the provisions of the Montana Administrative Procedures Act. The filing of a request for a hearing does not stay the Department's decision, unless the Board issues a stay upon receipt of a petition and a finding that a stay is appropriate under Section 75-2-211(11)(b), MCA. The issuance of a stay on a permit by the Board postpones the effective date of the Department's decision until conclusion of the hearing and issuance of a final decision by the Board. If a stay is not issued by the Board, the Department's decision on the application is final 16 days after the Department's decision is made.

F. Permit Inspection – As required by ARM 17.8.755, Inspection of Permit, a copy of the air quality permit shall be made available for inspection by the Department at the location of the source.

G. Permit Fee – Pursuant to Section 75-2-220, MCA, as amended by the 1991 Legislature, failure to pay the annual operation fee by Westmoreland may be grounds for revocation of this permit, as required by that section and rules adopted thereunder by the Board.

H. Duration of Permit – Construction or installation must begin or contractual obligations entered into that would constitute substantial loss within 3 years of permit issuance and proceed with due diligence until the project is complete or the permit shall expire (ARM 17.8.762).

Montana Air Quality Permit Analysis
Westmoreland Resources, Inc.
MAQP #1418-06

I. Introduction/Process Description

A. Source Description

Westmoreland Resources, Inc. (Westmoreland) operates the Absaloka Mine, which is a surface coal mine and handling facility. The Absaloka Mine is located about 30 miles east of the city of Hardin. The general legal description of the permit area is as follows: All or portions of Sections 23, 24, 25, 26, 35, and 36 in Township 1 North, Range 37 East; Sections 19, 20, 21, 29, 30, 31, and 32 in Township 1 North, Range 38 East, in Big Horn County, Montana.

The facility operates a centralized coal processing and handling system including a truck dump, crushing, conveying, storage barn, and a train load out. An in-pit truck dump and crusher and an overland conveyor system are operated, as well as the necessary auxiliary equipment, including dragline, trucks, shovels, scrapers, drills, dozers, etc., as applicable. The facility also operates two coal-fired boilers and several diesel-fired generators/engines as follows:

Generator list	Count	Horsepower
Generator #1	1	175
Generator #2	1	36
Generators/Engines for Light Plants	13	12
Generators/Engines for Welders	5	64
Generators/engines for Pumps	6	100
Generators/Engines for Maxi Heater	1	147

B. Permit History

On May 11, 1978, the Montana Department of Environmental Quality (Department) issued Montana Air Quality Permit (MAQP) #1218 to Westmoreland for the coal handling facilities at the Absaloka mine. The coal handling facilities included a truck dump, primary and secondary crushers, storage barn, loading tipple, and conveyor belts. On May 11, 1978, MAQP #1219 was also issued for the operation of the two coal fired boilers at the mine. On June 11, 1980, MAQP #1418 was issued to the mine. This permit covered both MAQPs #1218 and #1219. On February 27, 1985, **MAQP #1418A** was issued. The modification required a monthly averaging of sulfur and ash content, and a number of changes were made to the Monitoring and Reporting section for clarification in addition to the deletion of the meteorological monitoring requirements. On August 31, 1986, **MAQP #1418B** was issued to Westmoreland in which the reporting requirements regarding coal quality and consumption in the boilers were removed. The permit action deleted permit conditions III.A.1 and III.A.2 in MAQP #1418A.

The Department received a request from Westmoreland dated December 8, 1998, to modify MAQP #1418B. Westmoreland requested renewal of their permit as well as removal of the monitoring requirements. MAQP #1418B contained an expiration date because the original mine plan was to be completed by 1998. The Department renewed the permit and no expiration date was placed in the permit, which was consistent with current permitting actions. Westmoreland submitted a summary of their monitoring results, which demonstrated that their monitored ambient concentrations did not exceed the levels in the guidance document that required monitoring. Therefore, in accordance with the October 9, 1998, guidance document developed by the Department, the monitoring requirements were removed from Westmoreland's permit. The ambient monitoring requirements can be reinstated in the future if the Department determines that it's necessary. **MAQP #1418-03** replaced MAQP #1418B.

On January 27, 2005, the Department received a letter from Westmoreland notifying the Department of a de minimis change to the coal handling facility according to the provisions of the Administrative Rules of Montana (ARM) 17.8.745(1) and according to MAQP #1418-03. The de minimis change included the construction of a covered conveyor to transport coal from the existing train loading facility to a closed, elevated storage bin for truck loading (550,000 tons coal per year). The change also increased the vehicle miles traveled on the access road by an estimated 45,000 miles per year. The permitting action included the truck loading coal handling equipment and updated the permit to reflect current permit language and rule references used by the Department. **MAQP #1418-04** replaced MAQP #1418-03.

On June 3, 2008, the Department received an application for an administrative amendment from Westmoreland and was assigned **MAQP #1418-05**. After further discussions with Westmoreland representatives and a clarification of permit conditions reached, the Department determined that a permit action was not required. MAQP #1418-05 application was subsequently withdrawn and no permit was issued under that number.

C. Current Permit Action

On November 30, 2009, the Department received a complete application from Bison Engineering (Bison) on behalf of Westmoreland requesting a modification to MAQP #1418-04. The modification is in response to a letter from the Department dated August 28, 2009, requesting Westmoreland to update the facility's MAQP to reflect equipment currently on site. Although the diesel-fired generator equipment was originally permitted as "associated equipment", Westmoreland consistently reported emissions from this equipment in its annual emissions inventory reports. However, when this equipment is added to the MAQP's emissions inventory, Westmoreland's potential emissions are above the Title V Operating Permit threshold. Therefore, Westmoreland requested federally enforceable limits to keep the facility's potential emissions below the Title V Operating Permit threshold. **MAQP #1418-06** replaces MAQP application #1418-05.

D. Additional Information

Additional information, such as applicable rules and regulations, Best Available Control Technology (BACT)/Reasonably Available Control Technology (RACT) determinations, air quality impacts, and environmental assessments, is included in the analysis associated with each change to the permit.

II. Applicable Rules and Regulations

The following are partial explanations of some applicable rules and regulations that apply to the facility. The complete rules are stated in the ARM and are available, upon request, from the Department. Upon request, the Department will provide references for location of complete copies of all applicable rules and regulations or copies where appropriate.

A. ARM 17.8, Subchapter 1 – General Provisions, including but not limited to:

1. ARM 17.8.101 Definitions. This rule includes a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.

2. ARM 17.8.105 Testing Requirements. Any person or persons responsible for the emission of any air contaminant into the outdoor atmosphere shall, upon written request of the Department, provide the facilities and necessary equipment (including instruments and sensing devices) and shall conduct tests, emission or ambient, for such periods of time as may be necessary using methods approved by the Department.

3. ARM 17.8.106 Source Testing Protocol. The requirements of this rule apply to any emission source testing conducted by the Department, any source or other entity as required by any rule in this chapter, or any permit or order issued pursuant to this chapter, or the provisions of the Clean Air Act of Montana, 75-2-101, *et seq.*, Montana Code Annotated (MCA).

   Westmoreland shall comply with the requirements contained in the Montana Source Test Protocol and Procedures Manual, including, but not limited to, using the proper test methods and supplying the required reports. A copy of the Montana Source Test Protocol and Procedures Manual is available from the Department upon request.

4. ARM 17.8.110 Malfunctions. (2) The Department must be notified promptly by telephone whenever a malfunction occurs that can be expected to create emissions in excess of any applicable emission limitation or to continue for a period greater than 4 hours.

5. ARM 17.8.111 Circumvention. (1) No person shall cause or permit the installation or use of any device or any means that, without resulting in reduction of the total amount of air contaminant emitted, conceals or dilutes an emission of air contaminant that would otherwise violate an air pollution control regulation. (2) No equipment that may produce emissions shall be operated or maintained in such a manner as to create a public nuisance.

B. ARM 17.8, Subchapter 2 – Ambient Air Quality, including, but not limited to the following:

1. ARM 17.8.204 Ambient Air Monitoring
2. ARM 17.8.210 Ambient Air Quality Standards for Sulfur Dioxide
3. ARM 17.8.211 Ambient Air Quality Standards for Nitrogen Dioxide
4. ARM 17.8.212 Ambient Air Quality Standards for Carbon Monoxide
5. ARM 17.8.213 Ambient Air Quality Standard for Ozone
6. ARM 17.8.214 Ambient Air Quality Standard for Hydrogen Sulfide
7. ARM 17.8.220 Ambient Air Quality Standard for Settled Particulate Matter
8. ARM 17.8.221 Ambient Air Quality Standard for Visibility
9. ARM 17.8.222 Ambient Air Quality Standard for Lead
10. ARM 17.8.223 Ambient Air Quality Standard for PM_{10}
11. ARM 17.8.230 Fluoride in Forage

Westmoreland must maintain compliance with the applicable ambient air quality standards.

C. ARM 17.8, Subchapter 3 – Emission Standards, including, but not limited to:

1. ARM 17.8.304 Visible Air Contaminants. This rule requires that no person may cause or authorize emissions to be discharged into the outdoor atmosphere from any source installed after November 23, 1968, that exhibit an opacity of 20% or greater averaged over 6 consecutive minutes.

2. ARM 17.8.308 Particulate Matter, Airborne. (1) This rule requires an opacity limitation of less than 20% for all fugitive emission sources and that reasonable precautions be taken to control emissions of airborne particulate matter.

3. ARM 17.8.309 Particulate Matter, Fuel Burning Equipment. This rule requires that no person shall cause, allow, or permit to be discharged into the atmosphere particulate matter caused by the combustion of fuel in excess of the amount determined by this rule.

4. ARM 17.8.310 Particulate Matter, Industrial Process. This rule requires that no person shall cause, allow, or permit to be discharged into the atmosphere particulate matter in excess of the amount set forth in this rule.

5. ARM 17.8.322 Sulfur Oxide Emissions--Sulfur in Fuel. This rule requires that no person shall burn liquid, solid, or gaseous fuel in excess of the amount set forth in this rule.

6. ARM 17.8.324 Hydrocarbon Emissions--Petroleum Products. (3) No person shall load or permit the loading of gasoline into any stationary tank with a capacity of 250 gallons or more from any tank truck or trailer, except through a permanent submerged fill pipe, unless such tank is equipped with a vapor loss control device as described in (1) of this rule.

7. ARM 17.8.340 Standard of Performance for New Stationary Sources and Emission Guidelines for Existing Sources. This rule incorporates, by reference, 40 CFR 60, Standards of Performance for New Stationary Sources (NSPS). Westmoreland is an NSPS affected facility under 40 CFR Part 60 and is subject to the requirements of the following subparts.

   a. 40 CFR 60, Subpart A - General Provisions apply to all equipment or facilities subject to an NSPS Subpart as listed below:

   b. 40 CFR 60, Subpart Y Standards of Performance for Coal Preparation and Processing Plants – This subpart applies because Westmoreland meets the definition of a Coal Preparation Plant as defined by 40 CFR 60, Subpart Y.

D. ARM 17.8, Subchapter 5 – Air Quality Permit Application, Operation, and Open Burning Fees, including, but not limited to:

1. ARM 17.8.504 Air Quality Permit Application Fees. This rule requires that an applicant submit an air quality permit application fee concurrent with the submittal of an air quality permit application. A permit application is incomplete until the proper application fee is paid to the Department. Westmoreland submitted the appropriate permit application fee for the current permit action.

2. ARM 17.8.505 Air Quality Operation Fees. An annual air quality operation fee must, as a condition of continued operation, be submitted to the Department by each source of air contaminants holding an air quality permit (excluding an open burning permit) issued by the Department. The air quality operation fee is based on the actual or estimated actual amount of air pollutants emitted during the previous calendar year.

   An air quality operation fee is separate and distinct from an air quality permit application fee. The annual assessment and collection of the air quality operation fee, described above, shall take place on a calendar-year basis. The Department may insert into any final permit issued after the effective date of these rules, such conditions as may be necessary to require the payment of an air quality operation fee on a calendar-year basis, including provisions that prorate the required fee amount.

E. ARM 17.8, Subchapter 7 – Permit, Construction, and Operation of Air Contaminant Sources, including, but not limited to:

1. ARM 17.8.740 Definitions. This rule is a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.

2. ARM 17.8.743 Montana Air Quality Permits--When Required. This rule requires a person to obtain an air quality permit or permit alteration to construct, alter, or use any air contaminant sources that have the Potential to Emit (PTE) greater than 25 tons per year of any pollutant. Westmoreland has a PTE greater than 25 tons per year of particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}); therefore, an air quality permit is required.

3. ARM 17.8.744 Montana Air Quality Permits--General Exclusions. This rule identifies the activities that are not subject to the Montana Air Quality Permit program.

4. ARM 17.8.745 Montana Air Quality Permits--Exclusion for De Minimis Changes. This rule identifies the de minimis changes at permitted facilities that do not require a permit under the Montana Air Quality Permit Program.

5. ARM 17.8.748 New or Modified Emitting Units--Permit Application Requirements. (1) This rule requires that a permit application be submitted prior to installation, alteration, or use of a source. Westmoreland submitted the required permit application for the current permit action. (7) This rule requires that the applicant notify the public by means of legal publication in a newspaper of general circulation in the area affected by the application for a permit. Westmoreland submitted an affidavit of publication of public notice for the November 26, 2009, issue of the *Big Horn County News*, a newspaper of general circulation in the city of Hardin, Big Horn County, Montana, as proof of compliance with the public notice requirements.

6. ARM 17.8.749 Conditions for Issuance or Denial of Permit. This rule requires that the permits issued by the Department must authorize the construction and operation of the facility or emitting unit subject to the conditions in the permit and the requirements of this subchapter. This rule also requires that the permit must contain any conditions necessary to assure compliance with the Federal Clean Air Act (FCAA), the Clean Air Act of Montana, and rules adopted under those acts.

7. ARM 17.8.752 Emission Control Requirements. This rule requires a source to install the maximum air pollution control capability that is technically practicable and economically feasible, except that BACT shall be utilized. The required BACT analysis is included in Section III of this permit analysis.

8. ARM 17.8.755 Inspection of Permit. This rule requires that air quality permits shall be made available for inspection by the Department at the location of the source.

9. ARM 17.8.756 Compliance with Other Requirements. This rule states that nothing in the permit shall be construed as relieving Westmoreland of the responsibility for complying with any applicable federal or Montana statute, rule, or standard, except as specifically provided in ARM 17.8.740, *et seq.*

10. ARM 17.8.759 Review of Permit Applications. This rule describes the Department's responsibilities for processing permit applications and making permit decisions on those permit applications that do not require the preparation of an environmental impact statement.

11. ARM 17.8.762 Duration of Permit. An air quality permit shall be valid until revoked or modified, as provided in this subchapter, except that a permit issued prior to construction of a new or altered source may contain a condition providing that the permit will expire unless construction is commenced within the time specified in the permit, which in no event may be less than 1 year after the permit is issued.

12. ARM 17.8.763 Revocation of Permit. An air quality permit may be revoked upon written request of the permittee, or for violations of any requirement of the Clean Air Act of Montana, rules adopted under the Clean Air Act of Montana, the FCAA, rules adopted under the FCAA, or any applicable requirement contained in the Montana State Implementation Plan (SIP).

13. ARM 17.8.764 Administrative Amendment to Permit. An air quality permit may be amended for changes in any applicable rules and standards adopted by the Board of Environmental Review (Board) or changed conditions of operation at a source or stack that do not result in an increase of emissions as a result of those changed conditions. The owner or operator of a facility may not increase the facility's emissions beyond permit limits unless the increase meets the criteria in ARM 17.8.745 for a de minimis change not requiring a permit, or unless the owner or operator applies for and receives another permit in accordance with ARM 17.8.748, ARM 17.8.749, ARM 17.8.752, ARM 17.8.755, and ARM 17.8.756, and with all applicable requirements in ARM Title 17, Chapter 8, Subchapters 8, 9, and 10.

14. ARM 17.8.765 Transfer of Permit. This rule states that an air quality permit may be transferred from one person to another if written notice of Intent to Transfer, including the names of the transferor and the transferee, is sent to the Department.

F. ARM 17.8, Subchapter 8 – Prevention of Significant Deterioration of Air Quality, including, but not limited to:

1. ARM 17.8.801 Definitions. This rule is a list of applicable definitions used in this subchapter.

Westmoreland is not a PSD source since the facility is not a listed source and the PTE is below 250 tons per year of any pollutant (excluding fugitives).

G. ARM 17.8, Subchapter 12 – Operating Permit Program Applicability, including, but not limited to:

1. ARM 17.8.1201 Definitions. (23) Major Source under Section 7412 of the FCAA is defined as any source having:

a. PTE > 100 tons/year of any pollutant;

b. PTE > 10 tons/year of any one Hazardous Air Pollutant (HAP), PTE > 25 tons/year of a combination of all HAPs, or lesser quantity as the Department may establish by rule; or

c. PTE > 70 tons/year of PM_{10} in a serious PM_{10} nonattainment area.

2. ARM 17.8.1204 Air Quality Operating Permit Program. (1) Title V of the FCAA amendments of 1990 requires that all sources, as defined in ARM 17.8.1204(1), obtain a Title V Operating Permit. In reviewing and issuing MAQP #1418-06 for Westmoreland, the following conclusions were made:

a. The facility's PTE is less than 100 tons/year for any pollutant.

b. The facility's PTE is less than 10 tons/year for any one HAP and less than 25 tons/year for all HAPs.

c. This source is not located in a serious PM_{10} nonattainment area.

d. This facility is not subject to 40 CFR 60, Subparts A and Y

e. This facility is not subject to any current NESHAP standards.

f. This source is not a Title IV affected source, nor a solid waste combustion unit.

g. This source is not an EPA designated Title V source.

h. As allowed by ARM 17.8.1204(3), the Department may exempt a source from the requirement to obtain an air quality operating permit by establishing federally enforceable limitations which limit that source's potential to emit.

   i. In applying for an exemption under this section, the owner or operator of the source shall certify to the Department that the source's potential to emit, does not require the source to obtain an air quality operating permit.

   ii. Any source that obtains a federally enforceable limit on potential to emit shall annually certify that its actual emissions are less than those that would require the source to obtain an air quality operating permit.

Westmoreland has taken federally enforceable permit limits to keep potential emissions below major source permitting thresholds. Therefore, the facility is not a major source and, thus a Title V operating permit is not required.

3. ARM 17.8.1207 Certification of Truth, Accuracy, and Completeness. Westmoreland shall annually certify that its actual emissions are less than those that would require the source to obtain an air quality operating permit as required by ARM 17.8.1204 (3)(b). The annual certification shall comply with requirements of ARM 17.8.1207. The annual certification shall be submitted along with the annual emission inventory information.

   The Department determined that the annual reporting requirements contained in the permit are sufficient to satisfy this requirement.

III. BACT Determination

A BACT determination is required for each new or altered source. Westmoreland shall install on the new or altered source the maximum air pollution control capability, which is technically practicable and economically feasible, except that BACT shall be utilized.

The current permit action would neither add nor modify a source or sources. The boilers and generators have existed at the facility since it was originally permitted. No construction or changes in operation will be associated with the requested permit modification. Therefore, the Department believes there is no need to re-evaluate BACT for the sources affected by this application.

IV. Emission Inventory

Non-Fugitive Sources	TPY						
Emission Source	**PM**	**PM_{10}**	**$PM_{2.5}$***	**NO_x**	**CO**	**VOC**	**SO_2**
Primary Crusher	11.00	3.30	0.33	--	--	--	--
Secondary Crusher	11.00	3.30	0.33	--	--	--	--
Conveyers	0.53	0.02	0.00	--	--	--	--
Boilers – Coal-Fired	11.25	4.65	2.85	7.13	8.25	0.98	18.60
Train Loadout	0.66	0.23	0.03	--	--	--	--
Generators – Diesel	5.10	5.10	5.10	72.50	15.62	5.92	4.77
Truck Loadout	0.03	0.01	0.00	--	--	--	--
Total PTE Non-Fugitive Sources	**39.56**	**16.61**	**8.65**	**79.63**	**23.87**	**6.89**	**23.37**

Fugitive Sources	TPY						
Emission Source	**PM**	**PM_{10}**	**$PM_{2.5}$***	**NO_x**	**CO**	**VOC**	**SO_2**
Topsoil Removal (Scraper)	29.49	14.74	2.95				
Scrapers: Travel Mode	36.60	11.93	1.31				
Topsoil Dumping	0.69	0.33	0.05				
Overburden Drilling	3.82	1.91	0.38				
Overburden Blasting	41.08	21.36	1.23				
Overburden Removal by Dragline	1141.07	219.55	19.40				
Overburden Handling by Dozer	12.79	2.44	1.34				
Haul Roads – Travel	848.52	226.16	24.88				
Haul Roads – Repair by Grader	20.12	5.78	0.62				
Access Roads	26.84	7.29	0.80				
Wind Erosion	121.49	60.74	6.07				
Coal Drilling	0.56	0.28	0.03				
Coal Blasting	35.35	18.38	1.06				
Coal Removal	0.66	0.23	0.03				
Coal Dumping	0.66	0.23	0.03				
Open Storage	.025	0.12	0.04				
Mobile Sources Diesel Exhaust	13.78	11.33	9.47	375.75	168.10	16.60	0.30
Mobile Sources Gasoline Exhaust	0.03	0.03	0.01	1.49	28.19	1.72	0.02
Explosives	--	--	--	62.20	245.14	--	7.32
Total PTE Fugitive Sources	**2333.80**	**602.83**	**69.97**	**439.43**	**441.43**	**19.32**	**7.64**
Total PTE Non-Fugitive Sources	**39.56**	**16.61**	**8.65**	**79.63**	**23.87**	**6.89**	**23.37**
TOTAL PTE	**2373.36**	**619.44**	**78.62**	**519.06**	**465.30**	**26.21**	**31.01**

* A complete emission inventory for Permit #1418-05 is on file with the Department. The emission inventory reflects the increase in emissions associated with this permit action.

V. Existing Air Quality

The Westmoreland facility is located in all or portions of Sections 23, 24, 25, 26, 35, and 36 in Township 1 North, Range 37 East; Sections 19, 20, 21, 29, 30, 31, and 32 in Township 1 North, Range 38 East, in Big Horn County, Montana. Big Horn County is unclassifiable/attainment for the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants.

VI. Ambient Air Impact Analysis

The surrounding area (Big Horn County) is listed as attainment/unclassified for the NAAQS. The Department believes the current permit action will not cause or contribute to any exceedances of the ambient air quality standards.

VII. Taking or Damaging Implication Analysis

As required by 2-10-105, MCA, the Department conducted the following private property taking and damaging assessment.

YES	NO	
X		1. Does the action pertain to land or water management or environmental regulation affecting private real property or water rights?
	X	2. Does the action result in either a permanent or indefinite physical occupation of private property?
	X	3. Does the action deny a fundamental attribute of ownership? (ex.: right to exclude others, disposal of property)
	X	4. Does the action deprive the owner of all economically viable uses of the property?
	X	5. Does the action require a property owner to dedicate a portion of property or to grant an easement? [If no, go to (6)].
		5a. Is there a reasonable, specific connection between the government requirement and legitimate state interests?
		5b. Is the government requirement roughly proportional to the impact of the proposed use of the property?
	X	6. Does the action have a severe impact on the value of the property? (consider economic impact, investment-backed expectations, character of government action)
	X	7. Does the action damage the property by causing some physical disturbance with respect to the property in excess of that sustained by the public generally?
		7a. Is the impact of government action direct, peculiar, and significant?
	X	7b. Has government action resulted in the property becoming practically inaccessible, waterlogged or flooded?
	X	7c. Has government action lowered property values by more than 30% and necessitated the physical taking of adjacent property or property across a public way from the property in question?
	X	Takings or damaging implications? (Taking or damaging implications exist if YES is checked in response to question 1 and also to any one or more of the following questions: 2, 3, 4, 6, 7a, 7b, 7c; or if NO is checked in response to questions 5a or 5b; the shaded areas)

Based on this analysis, the Department determined there are no taking or damaging implications associated with this permit action.

VIII. Environmental Assessment

An environmental assessment, required by the Montana Environmental Policy Act, was completed for this project. A copy is attached.

DEPARTMENT OF ENVIRONMENTAL QUALITY
Permitting and Compliance Division
Air Resources Management Bureau
P.O. Box 200901, Helena, Montana 59620
(406) 444-3490

FINAL ENVIRONMENTAL ASSESSMENT (EA)

Issued To: Westmoreland Resources, Inc.
Absaloka Mine
P.O. Box 449
Hardin, MT 59034

Air Quality Permit Number: 1418-06

Preliminary Determination Issued: January 8, 2010
Department Decision Issued: March 9, 2010
Permit Final: March 25, 2010

1. *Legal Description of Site:* Westmoreland operates the Absaloka Mine, which is a surface coal mine and handling facility. The Absaloka Mine is located about 30 miles east of the city of Hardin. The general legal description of the permit area is as follows: All or portions of Sections 23, 24, 25, 26, 35, and 36 in Township 1 North, Range 37 East; Sections 19, 20, 21, 29, 30, 31, and 32 in Township 1 North, Range 38 East, in Big Horn County, Montana.

2. *Description of Project:* Under the current permit action, Westmoreland requests a modification to update the facility's MAQP to reflect equipment currently on site. Although the diesel-fired generator equipment was originally permitted as "associated equipment", Westmoreland consistently reported emissions from this equipment in its annual emissions inventory reports. However, when this equipment is added to the MAQP's emissions inventory, Westmoreland's potential emissions are above the Title V Operating Permit threshold. Therefore, Westmoreland requested federally enforceable limits to keep the facility's potential emissions below the Title V Operating Permit threshold.

3. *Objectives of Project*: The proposed project would update the permit to reflect emitting units currently at the facility.

4. *Alternatives Considered*: In addition to the proposed action, the Department also considered the "no-action" alternative. The "no-action" alternative would deny issuance of the Montana Air Quality Permit to the proposed facility. However, the Department does not consider the "no-action" alternative to be appropriate because Westmoreland demonstrated compliance with all applicable rules and regulations as required for permit issuance. Therefore, the "no-action" alternative was eliminated from further consideration.

5. *A Listing of Mitigation, Stipulations, and Other Controls*: A list of enforceable conditions, including a BACT analysis, is included in MAQP #1418-06.

6. *Regulatory Effects on Private Property*: The Department considered alternatives to the conditions imposed in this permit as part of the permit development. The Department determined that the permit conditions would be reasonably necessary to ensure compliance with applicable requirements and to demonstrate compliance with those requirements and would not unduly restrict private property rights.

7. The following table summarizes the potential physical and biological effects of the proposed project on the human environment. The "no-action" alternative was discussed previously.

		Major	Moderate	Minor	None	Unknown	Comments Included
A	Terrestrial and Aquatic Life and Habitats				X		Yes
B	Water Quality, Quantity, and Distribution				X		Yes
C	Geology and Soil Quality, Stability and Moisture				X		Yes
D	Vegetation Cover, Quantity, and Quality				X		Yes
E	Aesthetics				X		Yes
F	Air Quality				X		Yes
G	Unique Endangered, Fragile, or Limited Environmental Resources				X		Yes
H	Demands on Environmental Resource of Water, Air and Energy				X		Yes
I	Historical and Archaeological Sites				X		Yes
J	Cumulative and Secondary Impacts				X		Yes

SUMMARY OF COMMENTS ON POTENTIAL PHYSICAL AND BIOLOGICAL EFFECTS:
The Department has prepared the following comments.

A. Terrestrial and Aquatic Life and Habitats
B. Water Quality, Quantity, and Distribution
C. Geology and Soil Quality, Stability, and Moisture
D. Vegetation Cover, Quantity, and Quality
E. Aesthetics

The proposed project would not result in any increase in emissions from the Westmoreland facility. Listing all emitting units in the permit will characterize the actual emissions more appropriately. Therefore, the proposed project would have no impact on terrestrial and aquatic life and habitats, water quality quantity, and distribution, geology and soil stability and moisture, vegetation cover, quantity, and quality, or aesthetics in the proposed project area.

F. Air Quality

The proposed project would not result in any increase in emissions from the Westmoreland facility; therefore, the proposed project would have no impact on air quality in the proposed project area. The Department determined that controlled emissions from the source will not cause or contribute to a violation of any ambient air quality standard.

G. Unique Endangered, Fragile, or Limited Environmental Resources
H. Demands on Environmental Resources of Water, Air, and Energy
I. Historical and Archaeological Sites
J. Cumulative and Secondary Impacts

The proposed project would include the installation and operation of equipment that could result in a minor increase in actual emissions from the existing industrial source of air pollution. Since the proposed changes would occur at an existing industrial site, the Department determined that

any impacts to any existing unique endangered, fragile, or limited environmental resources, demands on environmental resources of water, air, and energy, historical and archaeological site, or cumulative and secondary impacts due to the potential for a minor increase in deposition of air pollutants associated with the proposed project would be minor and consistent with current impacts. Overall, any impact to any existing unique endangered, fragile, or limited environmental resource in the proposed project area would be minor and consistent with existing impacts.

8. The following table summarizes the potential economic and social effects of the proposed project on the human environment. The "no-action" alternative was discussed previously.

		Major	Moderate	Minor	None	Unknown	Comments Included
A	Social Structures and Mores				X		Yes
B	Cultural Uniqueness and Diversity				X		Yes
C	Local and State Tax Base and Tax Revenue				X		Yes
D	Agricultural or Industrial Production				X		Yes
E	Human Health				X		Yes
F	Access to and Quality of Recreational and Wilderness Activities				X		Yes
G	Quantity and Distribution of Employment				X		Yes
H	Distribution of Population				X		Yes
I	Demands for Government Services				X		Yes
J	Industrial and Commercial Activity				X		Yes
K	Locally Adopted Environmental Plans and Goals				X		Yes
L	Cumulative and Secondary Impacts				X		Yes

SUMMARY OF COMMENTS ON POTENTIAL ECONOMIC AND SOCIAL EFFECTS:
The Department has prepared the following comments.

A. Social Structures and Mores
B. Cultural Uniqueness and Diversity
C. Local and State Tax Base and Tax Revenue
D. Agricultural or Industrial Production

The proposed project would not cause a disruption to any native or traditional lifestyles or communities (social structures or mores), impact the cultural uniqueness and diversity of the area, impact the local and state tax base and tax revenue, or the agricultural or industrial production of the area because the proposed project would not change the current industrial nature of the operation or the overall industrial nature of the area of operation. The predominant use of the surrounding area would not change as a result of the proposed project. The proposed modification of the Westmoreland MAQP would not change the way the facility currently operates.

E. Human Health

The proposed project would not result in any increase in allowable emissions from the Westmoreland facility because the facility would not change the way they currently operate; therefore, the proposed project would result in no impacts to human health.

F. Access to and Quality of Recreational and Wilderness Activities

The proposed project would not impact any access to recreational and wilderness activities because the proposed project would occur at an existing industrial facility used for such purposes.

G. Quantity and Distribution of Employment
H. Distribution of Population
I. Demands for Government Services
J. Industrial and Commercial Activity
K. Locally Adopted Environmental Plans and Goals
L. Cumulative and Secondary Impacts

The proposed modification would not have any, impacts on the quantity and distribution of employment, the distribution of population, demands for government services, industrial and commercial activity, locally adopted environmental plans and goals, or cumulative and secondary impacts in the area because no additional employees would be required at the facility and the facility would be operated as it is currently operated.

Recommendation: An Environmental Impact Statement (EIS) is not required.

If an EIS is not required, explain why the EA is an appropriate level of analysis: There are no significant impacts resulting from the project; therefore, an EIS is not required.

Other groups or agencies contacted or which may have overlapping jurisdiction: Department of Environmental Quality - Permitting and Compliance Division (Air Resources Management Bureau and Industrial and Energy Minerals Bureau); Montana Natural Heritage Program; and the State Historic Preservation Office (Montana Historical Society).

Individuals or groups contributing to this EA: Department of Environmental Quality (Air Resources Management Bureau), Montana Natural Heritage Program, and State Historic Preservation Office (Montana Historical Society).

EA prepared by: Julie Merkel
Date: December 21, 2009